RAILROAD GAZETTE

FRIDAY, DECEMBER 24, 1897.

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Contributions.

Amber Lights for Caution.

ST. LOUIS, MO., Dec. 14, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Dec. 10 "P" advocates the use of amber for caution indication in distant signals in preference to a single or double white light. I find by many observations of the 6-in. amber lights used in the front end of the clear-story of one of the lines of electric street cars in this city that this light cannot be distinguished from white at distances greater than about 1,200 ft., and it is difficult to distinguish from white at distances between about 800 and 1,200 ft. It is only for short distances of less than about 500 ft. that the amber color is distinctly seen. Amber and white are too nearly alike to entitle the former to any special preference.

E. A. HERMANN.

The Bridge Station of the Manhattan Elevated.

BROOKLYN, Dec. 9, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A correspondent, over the signature "X"—(in this instance not a doubted quantity, although it is a pity he did not append his real name)—in a communication printed in the *Evening Post* Dec. 8, under title "A Woman's Experience on the Elevated," clearly and truthfully represents the risk and the danger of passengers during the busy hours at the bridge station of the Third Avenue Elevated Railroad; and, as he practically states, it is a wonder that in consequence of the crowding on the single narrow platform there a catastrophe has not occurred.

From the constructor's as well as the railroad operator's standpoint the remedy is simple, namely, to place two platforms, one on the outer side of each of the used tracks, so that passengers to the trains will take the present and central platform, and passengers from the trains will take one or the other of the new and outer platforms—thus avoiding all conflict of traffic currents.

The proposed platforms, however, cannot be built, or other more safe and convenient arrangements at this station be made which will in any way appear to further occupy the street, until certain rights of adjacent and influential property owners are acquired and extinguished. These rights, definite and restrictive, are protected by existing contracts between the parties interested and by legislative enactments—Laws of state of New York, chapter 4, passed Feb. 2, 1886; section 13, chapter 128, passed April 2, 1891.

Incidentally, this will explain why approach to the reconstructed New York station of the New York and Brooklyn Bridge, over Park Row and Centre street, was left as it is—incomplete and uncovered—and why the platforms of the new station were located so far from the street margins.

G. LEVERICH.

Bridging the North River.

NEW YORK, Dec. 15, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your issue of Dec. 10 contains a communication on the subject of *Bridging the North River*, which, per contra, is an argument for submarine tunnels, on the allegation that "with modern methods of engineering, and modern means of propelling cars, bridges are engineering absurdities." Your correspondent claims that "a tunnel would cost one-fifth as much as a bridge, could be built in one-half the time, would make the trip in one-tenth the time, would require one-fifth as much power to operate, would not impede or obstruct shipping, would occupy no valuable space on this island, would give to the commuter reasonable fare," etc., etc.

If all these be true, it is extremely important, and your correspondent, who signs his name, should lose no time to lay his discovery before investors, or before the transportation interests who might be benefited by it. He would then probably learn that plans for submarine tunnels with electrical cars, located just where he wants them to be, have been studied at considerable expense to some railroad interests by expert engineers of no mean order, but whose conclusions as to economy of cost, facility of operation and terminals do not coincide with his views.

However, the road to fame and fortune is open. I do not wish to discourage your confident correspondent from convincing capitalists of the excellence of his ideas, although a decent regard for accuracy should induce him in his arguments against a bridge not to set up, knowingly or unknowingly, the cost barely sufficient for a single track tunnel against the cost of an eight-track bridge. It may be a mere trifle to a superficial critic, but it would not be to transportation men and capitalists.

For the North River the case is unlike that of the East River, where bridges (and also tunnels) may be built, if need be, at public expense, without much reference to the question whether they pay or not. It is sufficient for getting the funds to obtain a majority of votes in Albany. But the crossing of the North River must be undertaken by private capital, as I have had occasion to point out before. No one need fear, with the lessons learned in this country, that now a days many millions of dollars of private capital will be handed over either for a tunnel or bridge scheme, without a very close examination of every aspect of any such undertaking.

There is undeniably a great deal of humbug in the promotion and agitation of various tunnel and bridge schemes across the North River. But out of it will grow in time no doubt both kinds of crossings, necessarily by a selective process for the reason above given. As an illustration of how it works I may mention that one of the numerous tunnel schemes was claimed by its promoters to be especially advantageously located; the prospectus set forth in glowing array the millions of passengers and tons of freight which were sure to pass through it, and which, at moderate rates, would produce a revenue of ample margin. Terminals and connections were provided, and the cost of the work was fortified by the combined guarantees, so called, of several contractors, and everything looked convincing. When the scheme was submitted to transportation interests it was quickly shown that a continuous procession of trains through the double-track tunnel at 10 miles per hour and with three minutes headway throughout the whole year could pass only a small fraction of the annual traffic which the promoters had assumed as the basis of a profitable revenue. Of course it let the wind out of the scheme without the need of further investigation.

As to a certain bridge scheme, very much exploited in the newspapers, and from which your correspondent, perhaps, had taken his cue, it were a waste of effort for me to show its hopeless condition. Let him have a little patience and things will right themselves.

GUSTAV LINDENTHAL.

Heavy Rails and Smooth Track.

DETROIT, Mich., Dec. 18, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Dec. 3 you started a discussion as to the riding qualities of track laid with heavy rail as compared with track laid with light rail. I think the discussion liable to bring out some valuable facts.

My notion is that the motion complained of on the stiff track is caused by the rough rail; this roughness coming from the imperfect straightening of the rails in the mills.

A few years ago lumpy rail cut very little figure, as the surface and line of our best roads were so poor comparatively that the lumpy rail was not noticed. We are now, however, getting to a point where the motion caused by the lumpy rail is decidedly perceptible and disagreeable. I think it unwise for the mechanical department of the railroads to undertake to correct an evil which their chief engineers and purchasing agents can very easily correct by insisting on having rail properly straightened at the mills.

GENERAL MANAGER.

ST. LOUIS, MO., Dec. 20, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Since you are open to conviction regarding the advisability of elastic track, (your issue of Dec. 17) I hope that Engineer Maintenance of Way and other elastic trackmen also have an opening to conviction; it is that opening which I should like to help fill. But first it would be instructive to know just what is meant by "elastic track," or rather, in what particular one of the the three grand divisions, ballast, crosstie and rail, the elasticity is expected to manifest itself.

Let us consider, The ballast: Does any one believe that a heap of mineral ballast is elastic in the ordinary sense of the term? If he does he reminds me strongly of an old supervisor whom I used to admire for his ingrained conservatism, who objected to the crusher-broken stone ballast because it had more "echo" than that broken by hand. If the elasticity is really there I am certain that thousands of engineers would like to know exactly how much ballast to put under the ties in order to give a sufficient amount of "spring." Here is a rare opportunity for elastic youth or conservative middle age.

The cross ties: their elastic quality is fully shown by the millions which are removed every year because the fiber immediately beneath the rail has been destroyed by repeated hammering. We put an oak or chestnut tie in the track and call it elastic; then in spite of its being knocked to smithereens several years before it would otherwise have been rendered useless, we continue to call it elastic. How convincing! Or else we protect it with a tie-plate whose principal quality is its rigidity. Do we in that case still look for elasticity?

The rail: The delightful "teeter" which accompanies high speed over a light rail, as the train bounds joyously from one elastic joint to the next, is one of the excitements which most people prefer to look back upon rather than forward to, while the material effects on the passengers and the rail are converse; the first cannot "set" and the second does take a "set."

Until I read the letter of Engineer Maintenance of Way, I supposed that the fallacy of elastic track had been fought into and scrapped in its last ditch; that it is not really dead the premises prove, but if my anonymous correspondent and his companions in heresy wish to be convinced let them reverse Horace Greeley's advice, "Go East! go East, young man!" Take a ride over a stone ballasted track laid with 100-lb. rail, on a limited train running at maximum speed, then give us your opinion on *inelastic* track.

LUKE FORWARD.

The "Composite" and Its Field.*

Even in New England, with its dense population, the public demand for increased service has for the past 10 years resulted in such additional passenger-train mileage as equaled, and in many cases outstripped, the increase in earnings. In other words, the average number of passengers using each train is no more than 10 years ago, despite the natural increase in population. With 16.6 per cent. of the steam railroad mileage of this country now or recently in the hands of receivers, an increasing demand for more expensive service, and with competition from trolley lines furnished with a right of way at the public expense taking the business of the steam railroads *only* where it is profitable and leaving the existing carriers to serve the public where the business must be done at a loss, the present situation certainly seems to justify careful examination.

During the year ending June 30, 1897, the number of passengers carried in and out of Boston shows an actual decrease over the previous period of 12 months, which amounts to a loss of nearly 4,000,000 passengers, or seven per cent., while the number of people transported by the West End Street Railway System, with its numerous suburban lines, shows an increase of 5,500,000 passengers. The past year has seen an application of electricity to the steam track of the New England Railroad between Hartford and New Britain—about 10 miles. The service between the two places was practically doubled, but arranged at a uniform interval of 30 minutes. No baggage was taken and the fare established at 10 cents, a reduction of substantially 45 per cent. The business increased over three-fold.

There are many places where similar increases in business might be expected, but even that increase of business in most localities would not warrant the necessary capital outlay for electrical equipment.

While speaking of the application of electricity to standard steam roads, it may be well to consider that subject a little, in view of the prevailing impression that the third rail should be indefinitely extended until the passenger locomotive had been abolished, if it has proved successful in one or two places.

While the locomotive may disappear after the perfection of electrical apparatus, we can but deal with the matter as it exists to-day, and will pause for a moment to consider the operation of a branch line, say 25 miles long, with an electric installation in comparison with the same service by standard trains drawn by locomotives.

It should be understood that the distance named, 25 miles, is the most advantageous which has yet been found in standard practice by the third rail, running 12½ miles in each direction, the third rail also distributing from the power station the necessary current without any additional outlay for copper feed cables. If the construction is of the overhead kind, and dependent upon copper trolley and feed lines, the available territory is reduced to about eight miles from the power house. Of course there are arrangements and apparatus which make more than this possible, but we can here discuss nothing but the practical installation commonly used.

An adequate power house, conductor and machinery will demand an outlay which will require for interest at six per cent. and depreciation enough annually to pay the interest on the value of a passenger locomotive and leave enough to pay for all the coal which it would need to pass over the line one way each hour 12 times a day. The labor cost of running the locomotive would manifestly be less than the combined expense of manning the motor and power house, besides saving the entire fuel cost of the generating plant. But if a service every 15 minutes is needed the interest would figure but a small

*Abstract of a paper read by Mr. C. Peter Clark, General Manager of the New England Railroad, at the December meeting of the New England Railroad Club.

fraction of the locomotive fuel per car mile, and even this will be much further reduced by running the plant seven days a week, more than 15 hours a day, and if the house has been well placed the chances are that additional lines radiating in other directions will contribute further economical results.

There is evidently little or no economy to be expected from electricity under such conditions as have been assumed, unless the business justifies more than an hourly service, and as this is seldom the case away from large places electricity, like compressed air, promises no improvement in the cost of operation, and we remain dependent upon the locomotive for the majority of our territory.

There are of course many things which enter into a comparison such as we have made beside the cost of operation—such as the superior ease of stopping and starting a light car in comparison with a heavy train, but these must be omitted here for the sake of brevity.

Let us examine the passenger-train loads by dividing the number of passengers carried one mile by the number of passenger-train miles run by the roads terminating in Boston. We thus obtain an average passenger-train load for the

	Passengers.
N. Y., N. H. & H.	73
Boston & Albany	70
Boston & Maine	59
New England	47
Fitchburg	47
B., R. B. & L.	43

No road in the country exceeds in passenger business per mile the Boston & Albany and New York, New Haven & Hartford roads. It therefore appears that the average number of passengers carried in one train upon the best passenger roads in the country could be sealed in one of their largest coaches.

If the average gross weight of trains on the New England Railroad is distributed among the average load of 47 passengers, the present method of locomotives shows about 7,500 lbs. dead weight moved for the accommodation of each passenger.

A statement of the passengers carried upon the various passenger trains of the New England road preliminary to a new timetable, and for the purpose of disclosing the average number of passengers carried upon the different trains, located about 325,000 passenger-train miles per year, carrying less than 25 passengers each, some averaging as low as six. While the obligation of the company to transport was recognized, the great loss of money in connection with this transportation naturally received careful attention. That public convenience would not admit of any substantial reduction in service was evident upon examination of each individual case. The necessity of reducing expenses was apparent and urgent, the property not having paid any dividend for six years.

Inquiry failed to suggest a vehicle suited to the conditions. If the steam locomotive must be run, it should be one capable of working economically, with a burden suitable for the transportation of not over a carload of passengers. These conditions suggested the old steam dummy, and an examination of one of the number manufactured for street service about 20 years ago was made. The limited speed at which it could comfortably travel was certainly against it, and the extremely disagreeable rocking and swinging motion, caused by the excessive overhang of car body, aggravated by the reciprocating motion from the cylinders connected to the sides of the car, gave little encouragement in this direction. While the whole subject was in this indefinite condition, the President and Vice-President of the Schenectady Locomotive Works took up the question, after consultation with Mr. Clark, which resulted in the building of the composite car (which was illustrated and described in our issue of Oct. 22, 1897, page 747).

The Reagan water grate, similar to that used on the Paris, was adopted, and is giving good satisfaction. A slight movement of a handle behind the engineer's seat is all that is necessary to furnish a fresh fire over the entire grate surface, no poker or other tool being required for either coke or anthracite. The fuel now used is coke.

The boilers are fed by two Hancock inspirators, the smaller of which is practically allowed to work without interruption. The Westinghouse quick-acting brake is used on all wheels, and in connection with the so-called "Composite" brakeshoe (which, however, is no relation to the car) containing seven cork inserts, gives a most satisfactory and finished braking power. A service stop from a speed of 40 miles an hour is easily made in less than 500 ft. on level track, with no suggestion of inconvenience to those standing in the car.

The composite car can be turned on a common wooden table furnished with ordinary wheels. Of course, the most expeditious and satisfactory way where land is obtainable, is to lay a small loop or "Y." The present composite will easily run around a loop of 200 ft. radius.

One of the most interesting problems encountered has been the application of the water storage tanks under the car floor. These tanks are two in number, 24 in. in diameter, and 30 ft. long. When full, they contain 1,500 gals. of water, weighing 12,500 lbs. As this water is partially or wholly used during a journey, it follows that the springs carrying the car must at all times be comfortable for the 60 passengers having seats provided whether the car body weighs 12,000 lbs., more or less. A careful study of the riding of the car with the tanks first filled, then empty, indicated that no ordinary application of truck springs would give an easy riding body with this great variation of load. The vibration seemed to come from the dead weight of tanks upon the old floor system. The tank hangers were then slightly changed and spiral springs inserted between their ends and the car sills, with satisfactory result, the spring absorbing enough of the jar to ease the frame and eliminate the tremor. Leaf springs were then substituted for the coil cushion with perfectly satisfactory results. A suitable steel floor system would doubtless avoid this trouble altogether.

Probably the most interesting and ingenious feature is the arrangement for carrying the car body upon the power truck. Around the base of the boiler box is fastened a circular casting of iron. In this casting is a groove in which are 125 1½-in. steel balls. A similar casting, with the groove upon the lower side, is built into the floor of the car, the intermediate sills of which are of necessity removed in the space needed for the boiler, with the casting upon the car floor resting upon the balls. In this way a circle of ball bearings is formed which enables the power truck to curve freely without appreciable friction, even with the considerable weight of the car body and contents. If there is any swinging motion to the power truck, a simple roll of the balls relieves the car from all sympathetic motion, there being no suggestion of reciprocating motion communicated to the car body.

As there was no accessible place for eccentrics between the wheels link motion was avoided and the Walchart system was substituted. The entire running gear is within reach outside the wheels. About 18,000 lbs. resting upon each driving wheel, liberal journals and four heavy leaf springs were required. The boiler is so constructed that while the flues are entirely submerged in water a circular steam chamber around the top affords the necessary opportunity to accumulate dry steam. Since the ejection of machinists' grease from the boiler there has been absolutely no tendency towards priming.

The best record for speed thus far attained is a mile in 61 seconds, or 59 miles an hour. This requires 472 revolutions of the 42-in. drivers every minute. It being generally understood that an engine should not run more miles an hour than there are inches in the diameter of the drivers, the engineer of the composite is instructed to keep below 45 miles an hour in speed, but frequently comes within two or three miles of that limit. The longest runs which have been taken are between 100 and 120 miles.

The water carried will last about 50 miles on fairly level track, and the coke bin carries fuel enough for a 100-mile run. The machine has ample power to haul at least one passenger coach, and in an emergency was called upon to move 11 freight cars, which was done without apparent effort.

The service application of the brake upon a level track gives a comfortable stop from 40 miles an hour in less than 500 ft., while a stop made entirely by the conductor's valve in the rear compartment of the car, with the throttle wide open and reverse lever in usual running position, speed indicator showing 27 miles an hour, resulted in a stop in less than 250 ft. in 14 seconds.

Not only does the composite with these qualifications appear able to cover all milage where the maxium number of passengers to be handled is within its limits, but possibly increase the gross revenue, and at the same time net earnings, by permitting the subdivision of some trains at present self-sustaining but which do not represent the full travel which might be developed by a more frequent service.

The composite car has run 12 miles without having the door of the firebox opened. This indicates little need of a fireman if the engineer upon a private right of way can properly be allowed as much responsibility as is placed upon a motorman operating the heavy electric cars in city streets with nothing but hand brakes and among the teams, crossing numerous blind street corners.

The Chapsal Electro-Pneumatic Brake.*

The Chapsal brake does not present itself as a new piece of apparatus excluding the use of other brakes, but may with slight modifications be applied to any of the systems now in use. The description of this brake

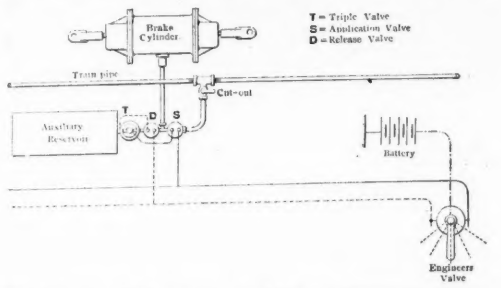


Fig. 1.—General Arrangement of Electro-Pneumatic Brake.

concerns principally its application to the Westinghouse Automatic Air Brake, which is in use on all the great French railroads.

Description of the Apparatus:

To transform the Westinghouse Brake (either Automatic or Quick Action Automatic) it is necessary (see Figs. 1 and 2)—

1. To add an electric application valve, which may be placed at any convenient point on the train pipe near the triple valve.

2. To add an electric release valve placed between the triple valve and the brake cylinder.

3. To slightly modify the upper portion of the triple valve so as to make of it an automatic commutator.

Two wires extend throughout the train, one to connect the application valves and the other to connect the release valves with the engineer's valve, the circuits being completed by the rails. The engineer's valve has added to it a metal crown piece arranged to permit the different electrical connections desired.

A current of from 10 to 15 volts and $\frac{1}{10}$ ampere for each carriage is required and is furnished by a small voltaic or storage battery.

Fig. 1 shows the arrangement of the valves and electric wires, Fig. 2 sections of the electric and triple valves, Fig. 3 a plan of the engineer's valve, and Fig. 4 sections of electric valves of somewhat different construction than those shown in Fig. 2.

In the electric application valve, Fig. 2 is an electro-magnet E, which, when the circuit is closed, lifts the plate m, thus closing the port v, and leaving the valve a free to lift. Below is a diaphragm d, which when depressed opens the valve c, otherwise kept seated by the spring r.

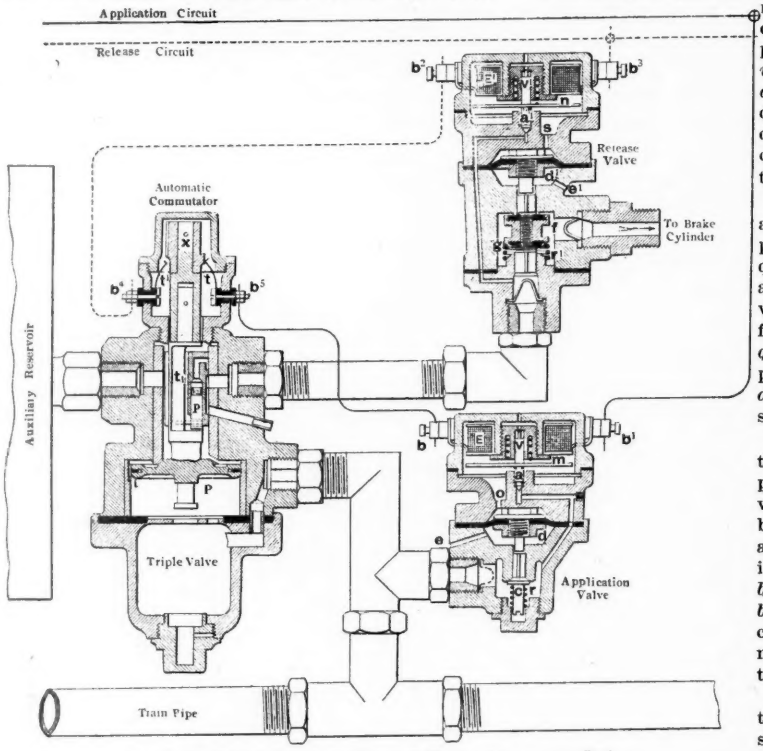


Fig. 2.—Details of Valves—Chapsal Electro-Pneumatic Brake.

In the electric release valve are an electro-magnet E^1, plate n, and diaphragm d^1 quite similar to those in the application valve. The lower valve, however, has two faces. When the lower face q is not seated by the depression of the diaphragm d^1 the upper face of f is kept seated by the spring r^1.

The triple valve has upon the end of the piston rod a piece x with two lugs which may strike the flexible silver contact strips t and t^1 respectively. Binding screw b^5 is connected to b, and thence through E and b^1 with the application circuit. Similarly, b^4 is connected to b^2 and thence to the discharge circuit.

There are six positions of the engineer's valve as shown by Fig. 3:

I, Electro-pneumatic release; V, electro pneumatic application; III, neutral, lap or on lap; II, electric release; IV, electric application; I_a, running position.

When the handle of the engineer's valve is placed in the position V, the application circuit is closed and in the electric valve under each car the plate m is lifted. Immediately the air in the train pipe lifts the valve a and by the port o passes to the chamber above the diaphragm d. As the port v is closed, preventing any loss of air to the exterior, the diaphragm is depressed with maximum rapidity and the valve c forced from its seat, thus permitting air from the train pipe to escape to the atmosphere through port e. When the reduction

* Abstract of a paper by George Lecouard, before the Society of Civil Engineers of France.

of pressure in the train pipe is sufficient to cause the triple valve to act, the electric circuit is broken at t and the electric application valve resumes its normal position.

As the loss of air from the train pipe has been just sufficient to lower the piston of the triple valve, the reduction of pressure above the piston, resulting from the flow of air to the brake cylinder from the auxiliary reservoir, soon restores equilibrium, and the piston of the triple valve returns to its normal position. The contact being made at t the electric valve again acts, and in consequence the triple valve also.

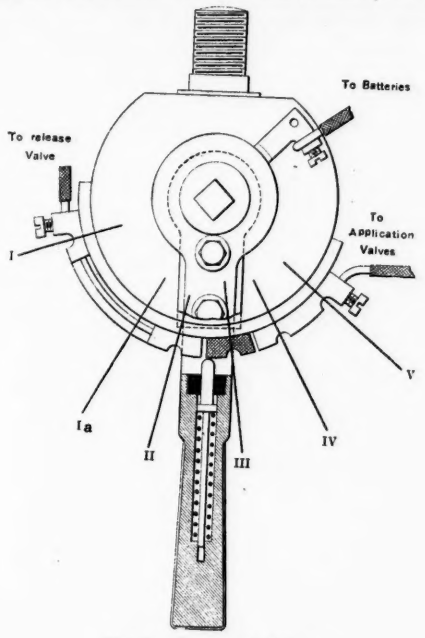


Fig. 3.—Engineer's Valve.

So long as the engineer's valve remains in the position V this series of phenomena will be repeated, two, three or four times until the loss of air from the train pipe at the engineer's valve has made itself felt under the car in question, or until the loss of air through the electric valve has been sufficient for a full application of the brakes.

The maximum time required for these three or four vibrations of the triple valve is but three seconds; and, further, all the triple valves act simultaneously, whatever the length of the train may be.

When the engineer's valve is placed in position I, the release current is closed and the plate n drawn toward the magnet E^1 closing v^1 and permitting the air from the auxiliary reservoir to lift the valve a^1 and pass, by means of the port s, to the chamber above the diaphragm d^1. The pressure upon the diaphragm depresses it and seats the valve g, allowing the air to escape from the brake cylinder to the atmosphere through f and e, thereby releasing the brakes. At the same time the pressure in the train pipe is being increased by the admission of air at the engineer's valve, and when the pressure has become sufficient to cause the triple valve piston to lift, the release circuit is broken at t^1, the electric release valve resumes its normal position and further discharge of air from the brake cylinder takes place through the triple valve.

The electric release valves act until increase in train pipe pressure is sufficient to cause the triple valve to act or until the release is complete. The time required for the complete electric release is 2½ seconds, and, consequently, the brakes on the rear cars of a long train will have been released before the increased train pipe pressure causes the triple valves to act.

Such rapid and simultaneous release action permits the brakes to be successively applied and released when the train is in motion without bringing any severe stress upon the draft rigging.

When the engineer's valve is in the position IV the electric application circuit is closed, but no escape of air from the train pipe occurs at the engineer's valve. The reduction of pressure in the train pipe is the same under each carriage, and is only sufficient to cause the triple valves to act. If a graduated application is desired, the engineer's valve is allowed to remain at IV for an instant only and then restored to III. Successive partial applications may thus be made, as is shown in Fig. 5.

If the engineer's valve be placed in position II, and allowed to remain there, the release circuit is closed, and the air in the brake cylinders escapes through the electric release valves as before described. A graduated release is secured by allowing the engineer's valve to rest at II for an instant only and then bringing it back to III.

In descending a grade it may be desirable to make successive partial applications and releases of the brakes to keep the speed constant while the grade varies, and this can readily be done by moving the engineer's valve between positions II, III and IV.

When the engineer's valve is in the running position *Ia*, the release circuit in each car is broken only at the point t^1 in the triple valve. Should the train pipe be ruptured with the engineer's valve in this position, the immediate effect would be to lower the pistons of each triple valve and open cummunication between the auxiliary reservoir and the brake cylinder; but at the same time the release circuit would be closed at t^1 and the electric valves permitted to act, which by closing the valves g would prevent passage of air to the brake cylinder, thus avoiding an emergency stop. The engineer would be advised of such an accident by the gage on the train pipe dropping to zero and by the increased speed of the air pump.

Should, however, the train break in two, an emergency application of the brakes would occur throughout the rear portion, because the release circuit would be broken and the electric release valves remain inactive.

With the engineer's valve in the running position Ia, it is impossible for a car to become braked in consequence of a local reduction in the train pipe pressure and an over-sensitive triple valve, because of the action of the electric release, as before explained. In case of the rupture of the train pipe when the engineer's valve is on lap III, an emergency stop will ensue unless the engineer, being advised of the accident by the slackening speed, should put his valve in position I. Notwithstanding that the train pipe may be completely emptied because of a break, the engineer can still make several successive applications and releases by using the electric valves.

In Fig. 5 are reproduced diagrams taken with a self-registering pressure gage, which show graphically the action of the brake as above described. On the vertical scale each division is one kilo. per square centimeter, or 14.2 lbs. per square inch; on the horizontal scale each division is one second of time.

In conclusion, the advantages claimed for this brake system may be summed up as follows:

1. There are always at the disposition of the engineer two absolutely distinct brakes, made to act simultaneously by a single movement of the engineer's valve, but at the same time independent of each other.

2. A shorter stop is obtained, because the brakes are applied to all the cars more quickly.

3. The action of the brakes is independent of the length of the train.

4. The release as well as the application is simultaneous for all cars.

5. There is perfect graduation of both the application and release and consequently the braking pressure may be made to conform to the profile of the track.

6. In case of the rupture of the train pipe with engineer's valve in running position, there is no emergency stop, and the engineer, being advised of the accident, may exercise his judgment as to whether he shall stop.

7. Although the train pipe may be cut the engineer may still make three or four applications and releases.

8. In case of rupture of the train pipe, the engineer's valve on lap, the engineer has the option of stopping or not, as may be most convenient.

9. In no case can a single car be braked by accident.

10. In case of failure of electric action the automatic action of the brakes is unimpeded.

11. The case with the electric valves, which are independent, may be inspected.

12. The possibility of using cars fitted with the electro-pneumatic brakes together with cars having the ordinary brakes.

We have just learned that the international jury of the Brussels exhibition has awarded a gold medal to the Chapsal brake. The President of this jury was M Blanquaert, Chief Engineer of the Belgian State Railroads, and the Vice-President, M. Salomon, Chief Engineer of rolling stock and motive power of the Eastern Railroad of France.

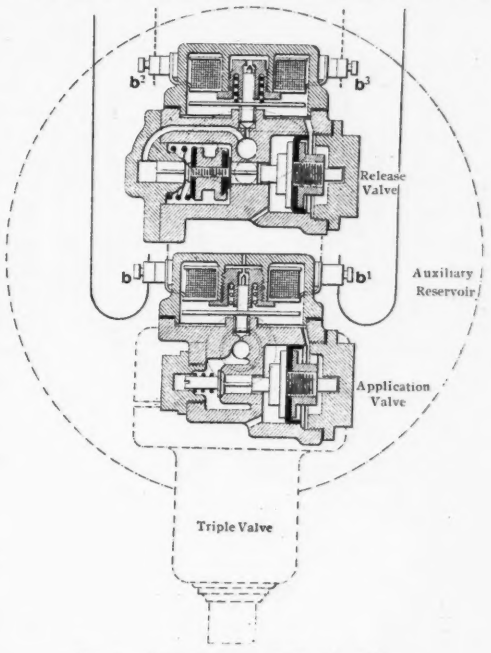


Fig. 4.—Arrangement of Electric Valves.

Car Ferry Lines.

The table given herewith, showing statistics concerning car ferry lines in various parts of the United States is based on the report made by the Car Service Committee to the American Railway Association at the last meeting of that association. As the committee's table contained much information not elsewhere gathered in one place we have copied it for reproduction here; but as the committee, on account of lack of time, was unable to include full data in all cases, we have made inquiries of officers of the roads interested and have filled out some items. We have also added a number of items, as for instance that showing the business of the New York Light. erage & Transportation Co., which does the freight business of the Lehigh Valley Railroad in New York harbor. It will be noted that two car ferries which were in operation at the time the committee made this report have since been abandoned. In another case, that of the New England Railroad, at Newburg, N. Y., the capacity of the ferry has been reduced, the float having been sold.

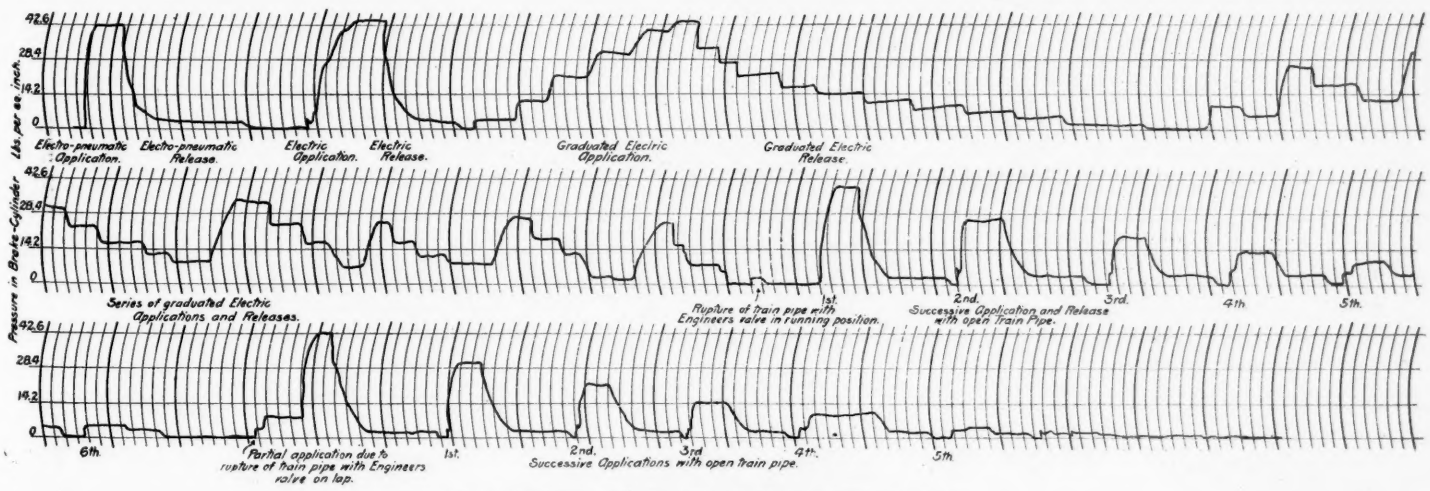


Fig. 5.—Diagrams from the Chapsal Electro-Pneumatic Brake.

Railroad (Jersey City); Thirty-third street and Thirty eighth street, N. R., New York, and Edgewater, N. J.

The ferry lines of the New York, New Haven & Hartford run to the Lehigh Valley Railroad, 11 miles; the Central of New Jersey, 11 miles; the Erie road, 12 miles; the Delaware, Lackawanna & Western, 13 miles; the West Shore, 16 miles; the Long Island Railroad, Long Island City, 6 miles, and to pier 45 E. R., New York, 8 miles.

The boats of the New York Central run to numerous points in New York Harbor, but we have no official statement from that road.

The Pennsylvania Railroad runs car floats all around New York harbor and also has similar lines on the Delaware River at Philadelphia, but, it appears, has declined to make reports to the committee. The Norfolk & Southern runs floats to various points in the harbor at Norfolk, Va.

The primary object in view in making this table was to throw light on the question of the rate of compensation for borrowed cars when carried on boats, and the data in the table showing the time that cars are on the boats was put in for this purpose. In some cases where the time, as shown, is very long, the figures include, we presume, the time that cars stand on floats to be loaded or unloaded. At most of the New York piers of the Jersey City railroads freight cars are not run ashore

Since the foregoing was written we have seen a report in a Chicago paper that the railroads west of that city have agreed that the rate of compensation per mile for borrowed cars carried on boats shall be the same as that for cars traveling on railroads. Whether or not the Wisconsin & Michigan Car Ferry is a party to this agreement we do not know.

A Cableway Over Chilkoot Pass.

The building of the Chilkoot Railroad from Dyea, Alaska, at the head of Lynn Canal, over Chilkoot Pass, to Crater Lake, a tributary of the Yukon River (described in our news columns Nov. 12), involves one feature of unusual interest. The first eight miles of the road to the foot of the pass is of ordinary construction; but the section over the mountain is to be an aerial cableway, Bleichart system, seven miles long. This cableway is being supplied by the Trenton Iron Co., of Trenton, N. J., though it will be put in place by the Chilkoot Railroad & Transportation Co., whose headquarters are at Tacoma, Wash. A letter to the *Railroad Gazette* from the Trenton Iron Co. gives the following details of this cableway:

The main carrying cables are made of special high grade steel ⅝ in. in diameter, with patent couplings for joining the ropes wherever necessary. The average height of the supports, which will be principally of iron, will be about 20 ft. Each support carries two lines of cable, one for the out-going and the other for the returning carriages. The traction rope, which is endless and driven by power from the power house, which will be at "Sheep Camp," is $\frac{7}{8}$ in. in diameter, made of special high-grade steel. The carriages are two wheeled; these wheels are steel castings of a diameter of about 9 in.

The grips are the Webber patent and of the ordinary style of carriage, grip and bucket, such as the company employs on its tramways, only in this particular case the hangers will not be spread so wide apart and the steel bucket will be omitted. The driving gear at the power house consists of a steel shaft 4 in. in diameter, carrying two driving sheaves 6 ft. in diameter, one of which is provided with steel grips to secure the proper bite on the rope. At the terminals are the necessary switch rails and automatic detachers by which the incoming buckets are automatically detached from the traction rope and switched on to the rail, where they are unloaded and then transferred round to the outgoing side and again loaded up and attached to the moving rope. These carriages will be sent out at intervals of about 90 seconds each, corresponding to a space interval of 450 ft. The velocity with which these buckets travel is about 300 ft. a minute, equivalent to about 3½ miles an hour. There are several quite long spans on the cableway, the longest of which is 1,600 ft., and clears the ground in one place at an elevation of about 100 ft. The total ascent from tidewater is about 3,600 ft., the first eight miles of the way being by surface railroad and the remaining seven miles by the cableway, which passes directly over the summit of the Chilkoot Pass and thence down to Crater Lake, where the other terminus will be located.

The power plant consists of an Erie automatic engine and a Worthington sectional boiler with complete outfit of shafting, clutch pulleys, etc., for driving the tramway. It is expected by the officers of the Chilkoot Railroad & Transportation Co. to have the entire plant in working order as soon as the season opens, when they expect to carry a large daily tonnage of freight, as well as passengers, who will, in the comparatively short time of an hour and a half, make the perilous journey over the Chilkoot Pass, that usually consumes several days, if not longer.

A recent issue of *Harper's Weekly* contained pictures purporting to show the proposed cableway, but the Trenton Iron Co. states that in this case the artist drew wholly on his imagination. In fact the buckets which

CAR FERRY LINES OF AMERICAN RAILROADS.

Railroad or Owner.	Car Ferry Lines. From	Car Ferry Lines. To	Length in miles.	Passenger or freight.	Equipment. Floats. Number.	Floats. Total capacity, cars.	Steamers. Number.	Steamers. Total capacity, cars.	Total vessels.	Total cap'city.	Capacity largest float or steamer.	Average daily number of cars ferried.	Length of time cars are on the floats or steamers.
Ann Arbor	Frankfort, Mich	Gladstone, Mich	98	P. & F.									
"	Frankfort, Mich.	Menominee, Mich	80	P. & F.									
"	Frankfort, Mich	Kewaunee, Wis	60	P. & F.	...	....	2	48	2	48	24	....	.....
"	Frankfort, Mich	Manitowoc, Wis	79	P. & F.									
Atlantic & Danville	West Norfolk	Within lighterage limits of Norf'k Har.	3 to 4.5	P. & F.	4	6	2	....	6	6	6	....	40 to 60 mins.
Baltimore & Ohio	St. George (Staten Isl'd).	Various points in N. Y. Harbor	.....	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Boston & Maine	E. Boston.	Boston (Met. S.S. Co.)	.5	F.	1	8	....	.....	....	....	....	16	.....
Brooklyn Wharf & W. Co	Mont'gue St., Brkln, N.Y.	Jersey City—C. R. R. of N. J.											
" "	" "	" " Lehigh V. R. R											
" "	" "	" " Erie Rd.											
" "	" "	New York—N. Y. C. & H. R. R. R.	....	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....
" "	" "	Weehawken—W. S.											
New York, P. & Norfolk	Norfolk, Va	Cape Charles	36	F.	5	100	5*	32	10	132	28	90	4 hours.
Canadian Pacific	Windsor, Ont.	Detroit, Mich	1	P. & F.	.....	.....	2	32	2	32	16	100	11 mins.
Cape Fear & Yadkin Valley	Point Peter, N. C	Wilmington, N. C	0 6	P. & F.	1	6	1	.....	2	6	6	12	.....
Central R. R. of New Jersey	Jersey City	Various points in New York Harbor	.....	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chesapeake & Ohio	Newport News	Norfolk, Va	12	F.	2	18	...	.....	2	18	12	25	2 hrs.
Delaware, Lackawanna & W	Hoboken, N. J.	New York—Cortlandt St.	1.25	F.	.....	.....	...	.....	..	.....	.....	.....	.....
" " "	" "	New York—Pier 41, N. R	1	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " "	" "	New York—Pier 58, N. R	2	F.	...	.....	.....	.....	.....	.....	.....	.....	.....
Illinois Central (*See Linehan R. T Co.*)	East Cape Girardeau	Cape Girardeau	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lake Mich. C. F. Trans. Co.	South Chicago	Peshtigo, Wis	240	F.	7	117	3 tugs	0	8	117	28	40	About 30 hrs.
" "	Manitowoc	Benton Harbor, Mich	175	F.									
Columbia & Western	Castlegar	Robson (across Columbia River)	0.3	F.	2	12	1	...	3	12	6	..	.....
Mich. & Ohio C. F. Transportation Co	Sandusky	Detroit	.....	F.	2	.....	.....	.....	.....	.....	.....	.....	.....
New York Central & H. R	Sixtieth St., New York	Barclay St., N. Y.											
" " "	" "	Long Island City, Hunter's Point, and various points in New York Harbor	.....	F.	.....	.....	...	.....	.....	.....	.....	.....	.....
Erie	Weehawken	Bayonne	9	F.									
"	Jersey City	Duane St., N. Y	1	F.									
"	Jersey City	23d St., N. Y	2	F.	22	235	.. ...	.....	22	235	17	180	6 to 12 hrs.
"	Jersey City	Long Island City	5	F.									
Erie & Huron and F. & P. M (*abandoned*)			.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Flint & Pere Marq. Trans. Co. (F. & P. M. R.R.)	Ludington	Manitowoc	56	P. & F.	.....	.....	1	30	1	30	30	30	3½ hrs.
Grand Trunk	Windsor	Detroit (D. G. H. & M. Slip)	0.5	P. & F.	0	.... ..	2	32	2	32	16	340	10 mins.
" "	Windsor	Detroit (Wabash Slip)	2	P. & F.									17 mins.
Illinois Central	Paducah, Ky.	Brooklyn, Ill	2	P. & F.	0	.....	1	16	1	16	16	100	30 min.
" "	Evansville, Ind	Major, Ky. (Henderson)	0 5	P. & F.	0	...	1	6	1	6	6	130	10 min.
Little Rock & Memphis	Memphis	Hopefield, Ark	1.5	P. & F.	.....	.....	1	10	1	.....	.....	54	About 30 min.
Long Island	Long Island City	Jersey City	6.3	F.	8	96	2	.....	10	96	17	208	3 hrs.
Maine Central	Bath, Me	Woolwich	0.6	P. & F.	.....	.....	2	8p. 16f.	2	8p. 16f.	.....	40p. 28f.	20 mins.
Michican Central	Detroit	Windsor	0.5	P. & F.	.....	.....	3	63	3	63	21	907	10 mins.
" "	Mackinaw	St. Ignace	8	P. & F.	.....	.....	2	30	2	30	20	.....	1 hr.
Mississippi River & Bonne Terre	St. Louis & E. St. Louis.	Riverside, Mo	30	F.	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " " "	Grand Tower, Ill	Crystal City, Mo	.....	F.	1	12	.....	.....	.....	.....	.....	.....	.....
Missouri Pacific	St. Lou's	East Carondelet, Ill	0.8	P. & F	.....	.....	2	11	2	11	6	80	15 mins.
W. & C. T. & Ferry Co													
St. Louis, I. M. & S. (inc. St. L. S. W.)	Cairo, Ill	Birds Point, Mo	4	P. & F.	.....	.....	3	32	3	32	12	175	45 mins.
" "	Columbus, Ky	Belmont, Mo	0.8	P. & F.	.....	.....	1	5	1	5	5	30	20 mins.
Mobile & Ohio	Cairo	East Cairo	0 5	P. & F.	.....	.....	1	10	1	.....	.....	200	10 mins.
Nashville, Chattanooga & St. L.	Incline, Ala	Gunters Landing, Ala	20	P. & F.	3	20	2	.....	5	20	8	6	3 hrs.
New England	Newburgh, N. Y	Fishkill Landing	0 5	F.	.....	.....	1	21	1	21	21	500	25 mins.
" and B. & M.	South Boston	East Boston	0 5	F.	1	8	.....	.....	1	6	.....	18	6 to 20 hrs.
Louisiana & Miss. R. T. Co. (A. & V.; V. S. & P.)	Vicksburg, Miss	Delta, La	0.8	P. & F.	.....	.....	1	12	1	12	12	30	15 mins.
New Orleans & Northwestern	Natchez	Vidalia	0.5	P. & F.	1	5	1	0	2	5	5	15	20 mins.
N. Y. Lighterage & Transp. Co. (L. V. R. R.)	Jersey City	Various points in New York Harbor	1 to 10	F.	19	223	7*a*	.....	.....	.....	17	275	.....
New York, New Haven & Hartford	Harlem River	Jersey City (Penn. R. R.)	12	P. & F.									
" "	Harlem River	Various points in New York Harbor	.....	F.	37	478	2	31	39	509	19	1,429	1 to 4 hrs.
New York, Ontario & Western	Oswego	Oswego	0.2	F.	1	3	.....	.....	1	3	3	.....	½ hr.
Norfolk & Carolina	Norfolk	Pinner's Point	1.4	P. & F.	3	10	1	.....	4	10	6	6	12 hrs.
Norfolk & Southern	Edenton	Mackey's Ferry, N. C	9	F.	1	10	.....	.....	1	10	10	9	4 hrs.
Northern Pacific	Kalama, Wash	Goble, Or	1	P. & F.	1	21	1	27	2	48	27	70	25 mins.
Philadelphia & Reading	Philadelphia	Camden	0 5 to 3	F.	11	88	3	.....	14	88	8	275	5 hrs.
Pittsburgh, Bessemer & Lake Erie (U. S. & Ontario Steam Nav. Co.)	Conneaut Harbor, O.	Port Dover, Ont	68	P. & F.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh Junction	36th St., Pittsburgh	13th St., Pittsburgh	.....	...	2	12	.....	.....	2	12	.....	150	45 min. to 1 hr.
Can. Pac. Car & Pas. Trans. Co.	Morristown, N. Y.	Brockville, Ont	1	P. & F.	2	7	6	8	8	15	5	79	10 to 12 m.
(R., W. & O.; O. & L. C.; C. P.)	Ogdensburg, N. Y.	Prescott, Ont	1	P. & F.									
Seaboard & Roanoke	Portsmouth Harbor	Norfolk	0.5 to 1	F.	2	12	1 tug	.....	3	12	6	1	½ to 1 hr.
Southern & B. & O.	Alexandria, Va	Shepherds, Md	1	F.	1	10	1 tug	.....	2	10	10	39	25 mins.
Southern	Pinner's Point	Within lighterage limits of Norfolk Har.	3 1	F.	3	12	1 tug	.....	4	12	8	5	6 hrs.
Southern Pacific	New Orleans	Algiers	0.8	P. & F	.....	.....	2	32	2	32	18	313	About 20 mins.
" "	San Francisco	West Oakland	5.8	F.	.....	.....	2	32	2	32	18	300	45 mins.
" "	San Francisco	Alameda Point	6.2	F.	.....	.....	2	30	2	30	16	40	40 mins.
" "	Port Costa	Benicia	1	P. & F.	.....	.....	1	44	1	44	44	400	11 mins.
Texas & Pacific	Gouldsboro, La	New Orleans, La	0.5	P. & F.	.....	.....	2	24	2	24	12	100	30 mins.
" "	" "	Port Chalmette											
West Shore	Weehawken, N. J	Various points in New York Harbor	.....	F.	10	23	.....	.....	10	103	13	180	.....
Yazoo & Mississippi Valley	Trotter's Point, Miss	Helena, Ark	1.50	P. & F.	0	.....	1	4	1	4	4	29	30 min.

NOT MEMBERS OF THE ASSOCIATION.

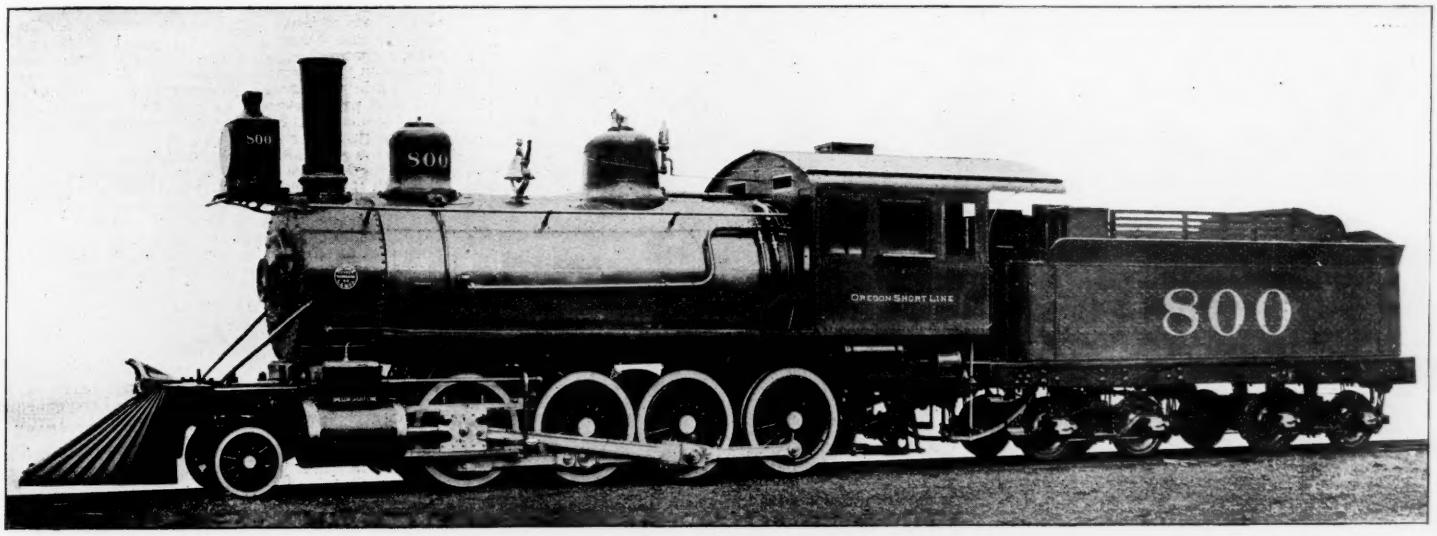
Linehan Ry. Transfer Co	Cape Girardeau, Mo	East Cape Girardeau	1.5	P. & F.	.....	.....	1	6	1	6	6	90	10 mins.
" "	Natchez, Miss	Vidalia, La	1	P & F.	.....	.....	1	6	1	6	6	70	15 mins.
Spokane Falls & Northern	Spokane Falls	Northport (*Discontinued.*)	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wabash, Chester & Western	Chester, Ill	Charyville, Mo	0.5	F.	1	3	1	.....	1	3	3	3 or 4	20 mins.
Wiggins Ferry Co	St. Louis, Mo	East St. Louis, Ill	0.6	F.	1	7	3	42	4	49	16	400	15 mins.

* 2 steamboats, 3 tugs. *a* 2 steamers, 5 tugs.

he depicts, showing four men in a bucket, are entirely wide of the mark, as the buckets to be used will be barrels sawed in half or wooden boxes of about that capacity, holding from 200 to 300 lbs., while in the case of passengers, a man will be seated on a boatswain's chair or something similar thereto, the idea being to keep the limit of weight down to the very lowest point possible.

A Cooke Consolidation for the Oregon Short Line.

The engraving shows one of two consolidation locomotives recently built for the Oregon Short Line by the Cooke Locomotive & Machine Co., of Paterson, N. J. Details of dimensions, etc., are given in the table. Certain peculiarities—as, for instance, the metal cab—are well shown in the engraving. The main driving-wheel centers are of steel, as is a heavy casting between the frames, forward of the cylinders, which serves the double purpose of a center for the truck and a rigid



A Cooke Consolidation Locomotive for the Oregon Short Line.

brace for the frames. The driving-boxes are of steel, and there are the usual steel castings.

COOKE CONSOLIDATION ENGINE FOR THE OREGON SHORT LINE.

Class	Consolidation
Gage	4 ft. 8½ in.
Total weight in working order	164,000 lbs.
" " on drivers	148,000 lbs.
" " on truck	16,000 lbs.
Loaded weight of tender	107,000 lbs.
Total wheel base of engine	22 ft. 3 in.
Driving-wheel base	14 ft.
Wheel base of engine and tender	52 ft. 6¼ in.
Cylinders	21 in. × 28 in.
Driving wheels	51 in. dia.
Engine truck wheels	30 in. dia.
Driving axle journal	8½ in. × 11½ in.
Engine truck axle journal	5½ in. × 10½ in.
Boiler type	Straight top
" working pressure	185 lbs.
" dia. first course	72 in.
" firebox length	120 7/16 in.
" " width	40¾ in.
" style of grate	Finger rocking
" tubes, number	270
" " dia. and length	2¼ in. dia. × 13 ft. 6 in. long
" thickness of shell	¾ in.
" heating surface tubes	2,133.8 sq. ft.
" " " firebox	179.9 sq. ft.
" " " total	2,313.7 sq. ft.
" grate surface	34.08 sq. ft.
Slide valve	Richardson-Allen
" " travel	6 in.
Steam ports	16 in. × 1⅝ in.
Exhaust ports	16 in. × 3¼ in.
Lap	1 in.
Exhaust pipe	Double
Smokebox	Short
" netting	Perforated plate
Center of boiler from rail	7 ft. 9 in.
Top of stack " "	15 ft. 4 in.

Tender.

Frame	Oak
Truck, style	Combination arch bar
" wheel	33 in. dia.
" axle journal	4¼ in. × 8 in.
Tank, water capacity	4,000 gals.
" coal "	14 tons

Lee's Gravel Roadbed for Railroad Bridges.

The trestle bridge floor designed by Mr. J. M. Lee, Superintendent of the Houston & Texas Central, and which has been in use on that road for the last four years, the been patented by him, and the drawing herewith shows the design of the floor as it has been adopted as the standard of the Houston & Texas Central. That road now has about 14,000 lineal feet of these floors. In all cases the track has been kept in order by the track repairers and the work of the bridge gangs has been correspondingly reduced.

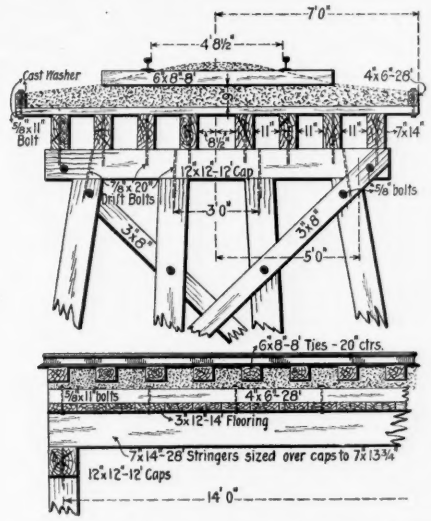
The peculiarity of this floor is the arrangement of longitudinal timbers resting on the trestle caps and supporting a transverse or diagonal plank floor. The timbers are laid so as to break joints and any single timber can be taken out for renewal without disturbing the others. This feature constitutes the principal point of difference between this design and that of the Southern Pacific, which was decribed in the *Railroad Gazette* of Sept. 24 last. In the Southern Pacific bridge the longitudinal timbers are twice as numerous and are laid close to one another so as to form a support for the gravel without he use of planks.

The chief purpose in making a continuous gravel floor for trestles is the simplying of the work of surfacing the track, already mentioned, and the protection of the bridge from fire, but of course the absorption of shocks is an important feature.

Modified Lease of the West End Street Railroad.

On Dec. 18 the Railroad Commissioners approved the modified lease of the West End Street Railway Co., to the Boston Elevated Railroad. This lease contains some important changes from the one submitted on Sept. 16 last. In the first place, the stipulated dividend rental on the West End common stock is reduced from eight to seven per cent. per annum. Second, the term of the lease is shortened from 99 years to 24 years eight months nine days from Oct. 1, 1897, so that the lease will expire at the same time as the one granted to the Boston Elevated. Third, there is inserted in the amended lease a clause to the effect that the Boston Elevated shall not diminish the facilities for travel on the West End road, as they existed at the time of granting the lease, except so far as substantially equal facilities are furnished in substitution therefor. Fourth, the clause that the lessor (the West End) shall make and execute such other leases or operating contracts with other street railroad companies as the lessee (the Boston Elevated) may request, has been stricken out.

Regarding the use of the subway, the lease refers to the former acts in which provision was made for its use in connection with elevated as well as surface railroads. In the act of 1894 the Boston Transit Co. was empowered to enter into contracts with any surface or elevated railroad company for location and other rights in the subway, so



Standard Trestle Bridge Floor, Houston & Texas Central Railway.

that the provision now made is in accordance with all the rights and obligations as created and governed by the provisions of this contract to the West End company. In regard to the enlargement of the subway, it is stated that by the subway act of 1895 the Boston Transit Co. was given the right to build any portion of the subway for less than four tracks, but was at the same time authorized to make suitable provision for the future enlargement of any such portion, so as to accommodate four tracks and to make such enlargement where the Commission deemed it expedient. The report of the State Railroad Commission concludes as follows:

It will hardly be questioned that the alterations in the lease as first submitted have materially improved it in the direction of the public interest. The more important change, in the view of the Board, is that which reduces the term of the lease to less than one-quarter of its original length, and thus brings it into harmony with the limited and tentative policy that has otherwise been adopted in dealing with the subject of metropolitan rapid transit.

As regards the proposed dividend rental of seven per cent. on the West End common stock, something should perhaps be added. In consideration of the generally anticipated benefits to be derived by the public from the execution of the elevated railway scheme, to the success of which a lease of the West End system is by many thought essential, the adoption of any extreme view as to a proper rental return would not in the judgment of the Board be wise. We are satisfied upon investigation that the impairment of the common stock which was shown in the previous report is not a now accruing impairment. In other words, the property deficit from which the impairment results would have been found larger some years ago than it now appears. If the continuance of present conditions were assured, there is reason to believe that the West End company would be able to repair its capital, to keep good its plant, and at the same time to maintain an average dividend rate of seven per cent. on the common stock. By granting the exemption from reduction of fares and the other immunities that have been referred to, the legislature has practically given an assurance that the existing conditions shall continue for 25 years. Under these circumstances it can hardly be said that the agreed dividend rental for the same period is without reason, or that it has not even the implied sanction of law. What would be a reasonable guaranteed dividend rental for 99 years is a different question.

It may be regarded as a matter for some congratulation that the stockholders of the corporations concerned have deemed it expedient, as shown by their recent votes, to make the concessions that have been noted. We are confident that in the long run it will not prove for their disadvantage to have done so. A public-service corporation can acquire no more valuable or remunerative asset than the reasonable satisfaction and goodwill of the public it undertakes to serve.

As the case now stands, and in view of the statutory provisions in deference to which our decision must be made, it appears to be the duty of the Board to approve the terms of the modified lease, so far as they relate "to the rental or compensation to be paid and to the due and safe transportation of the public."

Multiple Cylinder Steam Engines.*

EFFECTS OF VARIATION OF PROPORTIONS AND VARIABLE LOADS.

The paper is intended to exhibit the results of an experimental investigation of the relative efficiencies, with varying loads, of the ordinary high-pressure triple-expansion engine, of the compound of usual proportions at similar pressures, and of an intermediate type, in which the high-pressure element of the compound engine is made exceptionally small; the effect being practically that which would be produced by the suppression of the intermediate cylinder of the usual construction of triple-expansion machine. The machines employed in this research were the available combinations of the largest of the triple-expansion "experimental engines" of Sibley College, and the combinations adopted were:

1. The triple-expansion engine in its usual condition.
2. The intermediate and the high-pressure elements combined to make a compound engine of usual proportions—three to one.
3. The low and the high-pressure elements combined to produce a compound of the peculiar sort above mentioned—seven to one.

The *Transactions* of the American Society of Mechanical Engineers for the year 1892, Vol. XIII., contain the first account of the results of experimental investigation of the relative value of the peculiar form of compound engine.

A comparison made by Mr. F. W. Dean, of the performance of an engine designed by Leavitt with one designed by Rockwood, the one having a cylinder-ratio of four to one, the other of seven to one, later gave rise to further and interesting discussion.

But there still remain two important questions undecided:

(1) Are these comparisons fair, as being representative of the best work that each type of engine can perform; and does it follow that the study of the performance of each throughout a wide range of load-variation will prove that these conclusions may be accepted as general and as completely settling the relative standing of these machines?

(2) Assuming it to prove to be true that the orthodox system of designing the multiple-cylinder engine, as illustrated by the refined practice of Leavitt and of Reynolds, of Sulzer and of Corliss, and as taught in the text-books and treatises on the steam engine from a more purely scientific standpoint is right, is it always correct, as judged from the point of view of the purchaser and

*Abstract of paper presented at the New York meeting of the American Society of Mechanical Engineers, by Prof. Robert H. Thurston and Mr. Louis Brinsmade.

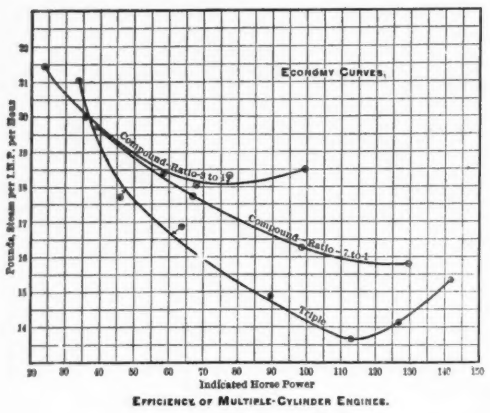
user of the engine, who counts success by the relation of quantity of work performed to the dollar expended, and not with reference, otherwise than incidentally, to the weight of steam or of fuel demanded per indicated horse-power in the unit of time?

The first of these questions can only be answered after it has become possible to produce a "curve of efficiency" on which may be read the relation of cost to performance throughout the full range, at least, of usual variation of working load, and for each of the machines to be compared. The second must be answered by a study of the costs of power-production, with each reduced to the measure of the efficiency of the dollar in each case.

The general dimensions of the engines employed in this investigation are:

	High Pressure.	Intermediate Pressure.	Low Pressure.
Diameter of cylinder, in inches	9	16	24
Length of stroke, in inches	36	36	36
Clearance, per cent:			
Head	7.74	8.79	9 5
Crank	7.45	8.89	9.2
Clearance, cubic feet:			
Head	0.103	0.376	0.895
Crank	0.092	0.367	0.812

Experiments with the cylinder ratio of 7 to 1 were made with care and show the variations in steam consumption for variations in the indicated power for each of four different low-pressure cut-offs. The curve for the 7-to-1 compound in Fig. 1 does not show a distinct



Efficiency of Multiple-Cylinder Engines.

Fig. 1.

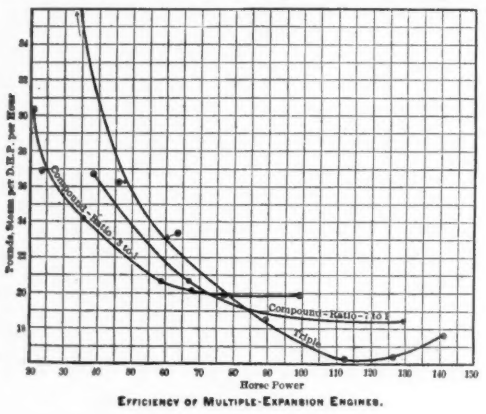
maximum economy; but from the horizontal drift at the heaviest loads, it would appear that these loads were very near those of maximun economy for this cut off.

A comparison of the results which show the maximum economy in these tests with those obtained on the 3-to 1 compound and triple-expansion Sibley experimental engines by H. K. Spencer in 1895, will serve as a basis of comparison.

The first set of data, obtained in 1895, was taken from the engine while running with the high-pressure and intermediate cylinders compounded, giving a cylinder ratio of a little over 3 to 1. The second lot of data is from the same engine, with all three cylinders in use. In both cases everything was jacketed except the low-pressure cylinders, thus giving approximately the same conditions that existed in the test, first mentioned, of the compound engine with a cylinder ratio of 7 to 1.

In the proportion and distribution of the receiver volume, the engine during the 3-to 1 compound and triple-expansion tests had an advantage. With the 7-to-1 cylinder ratio the engine had an abnormally large receiver volume, and, in the passage between the receivers, the steam was sent through a considerable length of piping which condeused some steam by radiation.

Curves plotted from the results of these experiments are given in Fig. 1. These show the variation of the steam consumption per *indicated* horse-power, with the increase in load, for the three prescribed sets of conditions. The curves in this figure leave no room for doubt in regard to the relative economy of the three engines.



Efficiency of Multiple-Expansion Engines.

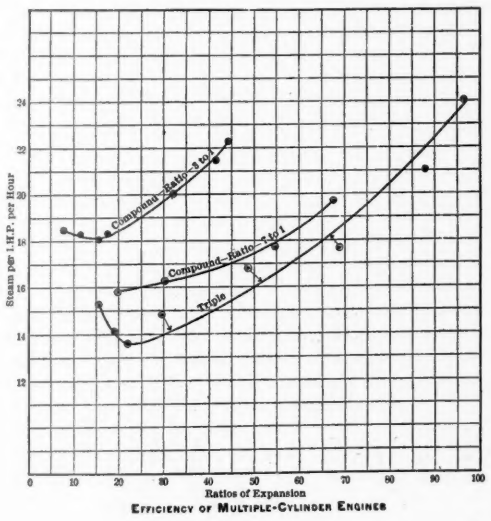
At the minimum points on these curves we have a gain of 2.2 lbs. of steam per indicated horse-power per hour of the 7-to-1 over the 3 to-1 compound, and a gain over the former by the triple-expansion engine of 2.1 lbs. of steam per indicated horse-power per hour.

Fig. 2 shows the variation in steam for delivered, or dynamometric, horse-power, with varying load for three cases. It will be noticed that the curves approach each other much more nearly than in the last figure. At the minimum the triple-engine curve exhibits best economy, but it falls off very rapidly, and at 75 H. P. shows a greater steam consumption than either of the others.

The 7-to-1 curve also crosses the 3-to-1 curve a little below this point. The reason for this is probably the friction of the extra bearings and the weight of the intermediate valve rods, which the construction of the engine made it impossible to avoid for the tests on the 7-to-1 compound. Otherwise there are about the same number of working parts as in the 3-to-1 compound, and there should be very nearly the same per cent. loss by friction.

The minimum points in these curves are 18 9 for the 3-to-1, 18.1 for the 7-to 1, and 17.1 for the triple-expansion, showing a gain on the triple over the curves of Fig. 1 of 1 lb. of steam by the 7-to-1 compound, and a little over 2 lbs. by the 3-to-1 compound.

Fig. 3, perhaps the most instructive of the series, shows



Efficiency of Multiple-Cylinder Engines

Fig. 3

the variation in the steam used for indicated horse-power per hour, with the ratio of expansion for the three cases. In the 3-to 1 compound and the triple the most economical ratios are apparent—about 12 for the 3-to-1, and 21 for the triple. Assuming the most economical expansion in any one cylinder for a continuous expansion line to be three, this would make, in the case of the 3-to-1 compound, a total expansion of 9, showing that in the above case there was comparatively little expansion in the receiver. In the case of the triple the division of the expansion ratio is taken from the most economical card, which is as follows: 2.7 in the high-pressure cylinder, 3.15 in the intermediate, and 2.16 in the low-pressure cylinder, making a total of 18.5 as the expansion ratio, which makes the expansion line practically continuous.

In the 7-to 1 compound the best ratio of expansion is beyond the limits of the curve, but would apparently be in the neighborhood of 17. The distribution of the expansion, however, at the most economical point obtained was 2.7 in the high-pressure cylinder, 2.21 in the low-pressure cylinder, leaving 2.85 as the expansion ratio in the receiver. This division is very nearly the same as in the triple-expansion engine, the receiver taking the place of the intermediate cylinder.

To show more clearly the location of the gains in economy of the triple-expansion engine over the 7-to-1 compound, Fig. 4 was constructed from the most economical tests on both engines. As these two tests had nearly the same high-pressure cut-off, it is easy to trace the action of the steam throughout the stroke, and the gains and losses of the two systems are made very evident.

These cards show a loss in area due to drop and a gain in the clearance spaces and in the expansion line of the low-pressure cylinder, although the latter gain is probably increased by the poor vacuum in the 7-to-1 compound. The diagram also serves to show the respective amounts of work obtained by an increase in the steam pressure and by an increase in the vacuum; the area at the top representing the work due to an increase in steam pressure of over 10 lbs., while the area at the bottom represents the work obtained by about 2 lbs. better vacuum.

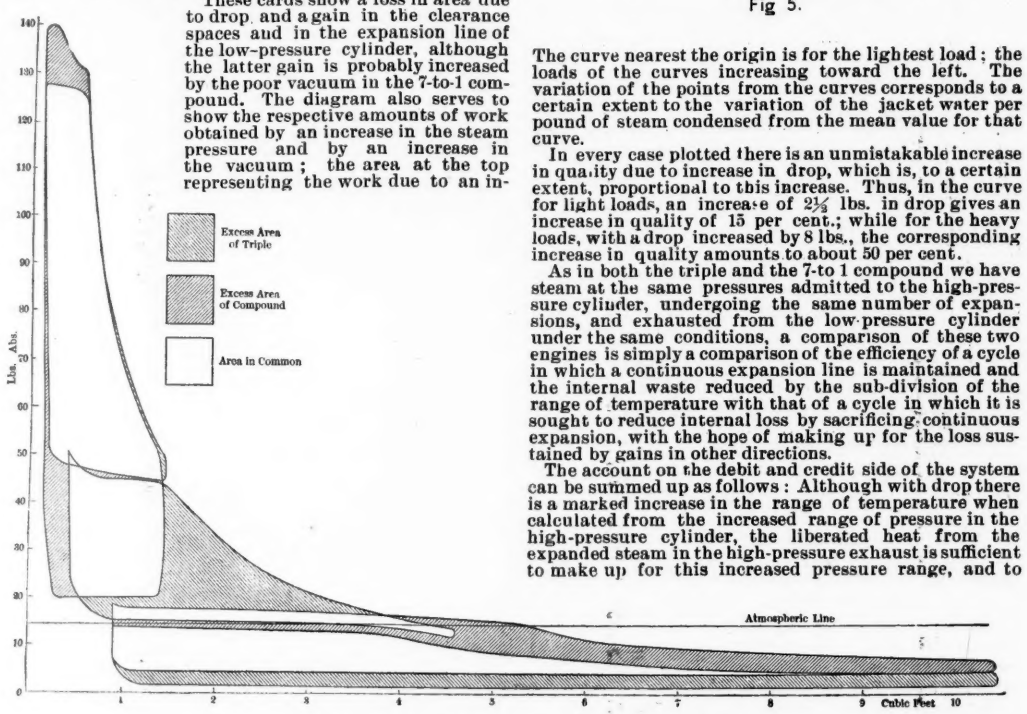


Fig. 4.—Triple and Compound Engine Diagrams.

The problem for the multiple-cylinder engine involves the selection of such a ratio as will suit not the best load of the engine, but that load which must be taken as the probably best mean for the series of variations which are anticipated as characterizing the probable life-action of the engine. The ratio of chosen boiler pressure to selected terminal pressure ordinarily settles the total ratio of expansion and that of the cylinders and all proportions of the engine for constant load; but this is not true with such variations of load as are daily witnessed in the operation, for example, of the power stations of electric railroads. It may, in this case, be found that "drop" is a requisite of best mean performance, whether thermal or commercial, and new relations of expansion in cylinders in series may be best.

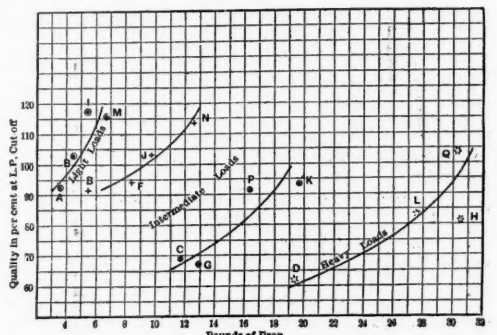
But these are not all the new considerations coming in to complicate this question in the practical case of every-day work. It may prove so much cheaper to build, as well as to operate, an engine in which we have the equivalent, practically, of the triple-expansion engine, for example, with the intermediate cylinder cut out, as to make it a better dividend earner than the unmutilated triple-expansion engine. The reduced cost of construction may more than pay for the loss of efficiency, even at its best load, and with variable loads it may prove that the unorthodox form of compound may pay better than either its orthodox competitor or the triple-expansion machine. Such are the still existing problems for the designer.

In conclusion, these comparisons, after making all allowances, show an economy in favor of the triple, when compared to the 7-to-1 compound, of over one pound of steam per horse-power per hour, and a larger gain by the latter when compared to the compound engine of 3-to-1 ratio. The bearing of these results, however, on the relative merits of the three types, is a matter which experiment on one engine and under one set of conditions cannot definitely determine. As tests have been made of the triple expansion engine under all systems of jacketing, there is no room for improvement in this direction. In the 7-to-1 compound, however, a change in the jackets, and even more probably a change in the size and distribution of the receiver volumes, might reduce, if not nearly bridge over, the gap which at present separates it, so far as steam consumption is concerned, from the triple-expansion engine.

In looking over the water account of both the triple-expansion and the 7-to-1 compound, we find that all the water used by the latter, in excess of the former, passed through the cylinder, and that there is no appreciable difference in the jacket water in either case. This indicates that the waste is internal and due to either an extra loss by cylinder condensation, to a greater clearance loss, or to a loss coming of incomplete expansion of the steam. That the greatest waste is due to incomplete expansion in the high-pressure cylinder, and that there is a slight gain in the cylinder volume, are both made evident by theory and are clearly indicated on the diagram showing the superposed cards of the engines.

The comparative amount of cylinder condensation in the two engines, and the manner in which this dendensation is affected by the drop in pressure between the cylinders, is a matter on which there has been considerable doubt, and on which these tests seem to throw some valuable light.

The curves in Fig. 5 show the effect of variation in drop on the quality of the steam at low-pressure cutoff.



Effect of "Drop" on Quality of Steam, in Low-Pressure Cylinder at Cut-off; Constant Load.

Fig 5.

The curve nearest the origin is for the lightest load; the loads of the curves increasing toward the left. The variation of the points from the curves corresponds to a certain extent to the variation of the jacket water per pound of steam condensed from the mean value for that curve.

In every case plotted there is an unmistakable increase in quality due to increase in drop, which is, to a certain extent, proportional to this increase. Thus, in the curve for light loads, an increase of 2½ lbs. in drop gives an increase in quality of 15 per cent.; while for the heavy loads, with a drop increased by 8 lbs., the corresponding increase in quality amounts to about 50 per cent.

As in both the triple and the 7-to 1 compound we have steam at the same pressures admitted to the high-pressure cylinder, undergoing the same number of expansions, and exhausted from the low-pressure cylinder under the same conditions, a comparison of these two engines is simply a comparison of the efficiency of a cycle in which a continuous expansion line is maintained and the internal waste reduced by the sub-division of the range of temperature with that of a cycle in which it is sought to reduce internal loss by sacrificing continuous expansion, with the hope of making up for the loss sustained by gains in other directions.

The account on the debit and credit side of the system can be summed up as follows: Although with drop there is a marked increase in the range of temperature when calculated from the increased range of pressure in the high-pressure cylinder, the liberated heat from the expanded steam in the high-pressure exhaust is sufficient to make up for this increased pressure range, and to give even a slightly improved quality at the high-pressure point of cutoff. This liberated heat also has the effect of superheating the steam, and thus of lessening the internal loss in the low-pressure cylinder. There is also a gain of work, owing to the absence of an intermediate cylinder whose clearance volume exceeds that of the high-pressure cylinder by the ratio of the squares of their respective diameters.

To balance these useful effects of drop we have only the gain by expansion in the intermediate cylinder; but, as demonstrated by these experiments, this gain is sufficient to outweigh all else, and to turn the balance in favor of a continuous expansion line.

When the practical uses of the 7-to-1 compound are considered, although at a disadvantage when working at a constant load, under loads subject to large varia-

tion, such as exists in an electric-power plant, the flatness of the economy curve would seem to indicate that it would more than hold its own. In a comparison of the 7-to-1 with the 3-to-1 compound, all efficiencies seem to favor the larger cylinder ratio. Whether 7-to-1 is the most economical ratio, or whether the most economical cylinder proportion lies at some intermediate point, is beyond the scope of this series of tests to determine. The best cylinder-ratio probably varies somewhat with the work for which the engine is intended, and in an exact determination of the best proportions for maximum economy there remains a large field for experimental investigation.

In studying the preceding figures, it must be carefully kept in mind that the real comparison is by *delivered*, rather than *indicated* power, and that the final basis of comparison must, in all cases, be the financial one. It is further to be noted that the curves here given as efficiency curves cover a much larger range of expansion than is either usual or economical in the ordinary commercial conditions of the market; the important and interesting data are those appurtenant to the lower values of the ratio of expansion in this series of engine trials.

The superior quality of steam in the high-pressure cylinder of the 7-to-1 compound engine, due, as it would seem, to the peculiar conditions affecting that machine, would indicate that the process of change of quality was the following: The exceptional drop at exhaust causes a correspondingly exceptionally complete discharge of the charge of mixed water and steam, unusually complete drying of the cylinder walls by re evaporation, and such promptness of action that comparatively little heat is rejected from the dry cylinder wall during the exhaust period. This results in corresponding reduction of the heat-exchange waste during the succeeding induction period, and this, in turn, means some economy of heat, steam and fuel, notwithstanding the fact of an exaggerated range of temperature and of pressure in the high-pressure cylinder, circumstances tending to increase wastes.

The main deduction, from a scientific point of view, if not from that of ordinary practice, being that the accepted system of multiple-cylinder engines with continuous expansion and with the number of cylinders in series determined by the steam pressure, the resultant desirable ratio of expansion and the quantity of consequent "cylinder condensation" is that which affords highest economical results, and that which constitutes the highest type of engine of our time, it becomes, further, desirable to ascertain what is the best adjustment of this particular series-engine. This is now well understood to vary with the whole series of variable conditions affecting the engine—with size, with engine speed, with steam pressure, vacuum, and the condition of the working fluid and of the cylinder wall.

The special form of compound is seen, on examination of its proportions, to be a form of engine designed for an abnormally high total ratio of expansion at the proposed pressure, and assigned an abnormally heavy load, so that when actually in action under its average load, it must work with a low ratio of expansion in the high-pressure cylinder, and must exhibit an abnormally large "drop" at its exhaust. It is a compound engine thermodynamically misapplied, and operated under conditions—ideally, at least—defective. It remains to be seen, however, whether with variable load this may not prove on the whole a practically correct and financially efficient system.

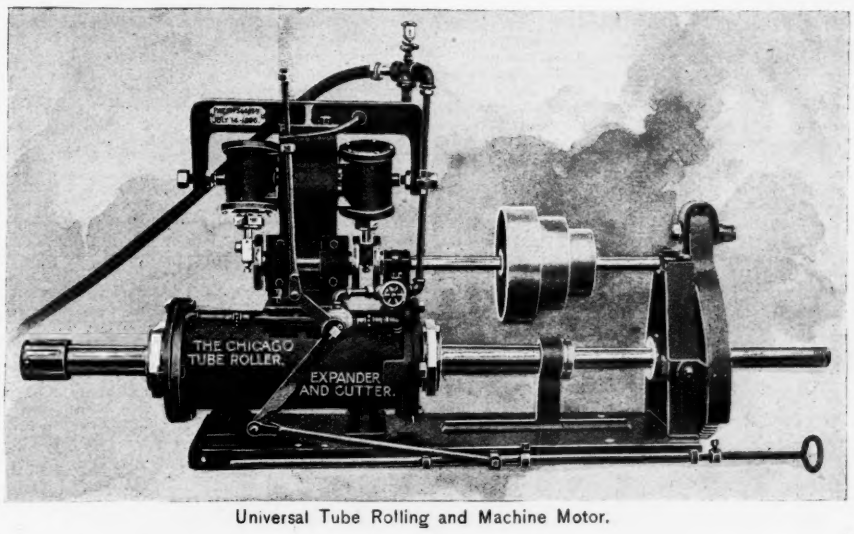
Universal Tube Rolling and Machine Motor.

About a year ago, the Chicago Pneumatic Tool Co. brought out a useful motor arranged to drive a tube rolling machine, as shown in the accompanying engraving. This machine has two oscillating cylinders 3 × 3 in., which together develop 3½ H. P. at a thousand revolutions per minute. The shaft is geared in the ratio of 5 to 1 to the feed spindle, which is made to revolve, and at the same time this spindle is given a longitudinal movement so that 18 H. P. is developed on the feed spindle, and a pressure of 2,277 lbs., forces it longitudinally in either direction. In order to secure this result, air is used at 80 lbs. working pressure per square inch. The lower cylinder shown in the illustration is 6 in. in diameter and has an equal air pressure on both sides of the piston, the movement in either direction being produced by a reduction of pressure on either side of the piston. When the spindle is stopped the air pressure is equalized on both sides which balances the feed spindle so that it can be moved in either direction and at any speed desired by the operator, who has the machine under perfect control at all time.

Experiments made on the Buffalo, Rochester & Pittsburgh in October last show some very interesting results in the cost of rolling tubes by means of this new machine and beading them by the Boyer pneumatic hammer, compared with the hand-rolled tubes. A comparative test of 150 tubes rolled first by means of the tube rolling machine and beaded by the pneumatic hammer showed that the cost of labor when using the machines was $3.67, while the same number of tubes rolled and beaded by hand cost $9.15.

One hundred and fifty tubes cut out and removed from boilers cost $1.61 for labor and the same work cost $4.34 by hand. The total saving in material on each tube amounted to 2 in. or 25 ft. for 150 tubes removed, which at 17 cents per foot, amounted to $4.25. Besides the savings above noted, it was found that it was not necessary to recut one end of the tube after the machine had cut them off out, as they were able to weld the ends that had been cut off by the machine. This amounted to 28 cents The total saving to the company on the complete operation was $12.74.

Mr. J. A. Barhydt, master mechanic of the road, adds that if it should be the desire of the user of the machine to bead in the front end the cutters will cut outside of the sheet to the required length, making it unnecessary to remove the tubes from the boilers in order to cut to the required length.



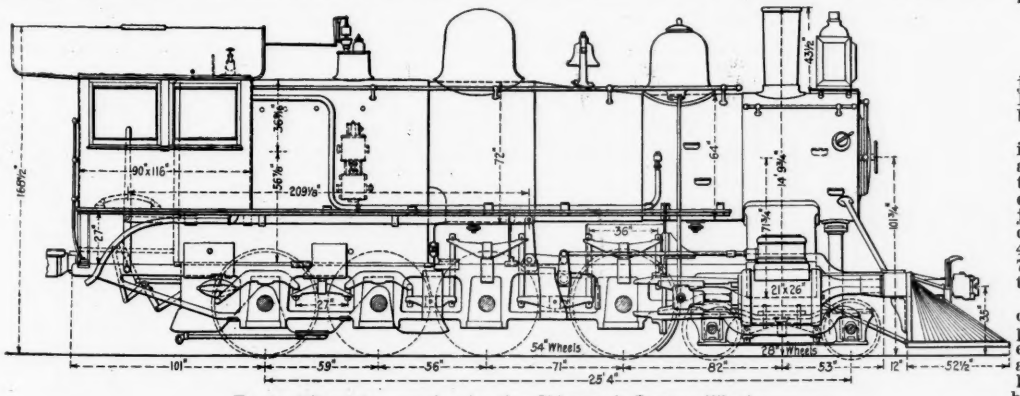
Universal Tube Rolling and Machine Motor.

The machine shown herewith consumes two cubic feet of free air for each tube rolled, and will roll 250 tubes in three hours; and will cut off 250 tubes inside the flue sheet in one hour.

These motors can also be used for variety work about the shop, the present application to rolling tubes being but one of the many uses to which it can be applied.

Twelve-Wheel Locomotive for the Chicago & Eastern Illinois.

We have received from Mr. Lawes, Superintendent of Motive Power, a blue print showing a general elevation of a new 12-wheel locomotive recently built for the Chicago & Eastern Illinois, also specifications of the engine. Particular attention is called to the large grate area. The coal burned is run of mine, and it is believed that this large grate surface will burn it economically. The train service is very heavy and locomotives of the dimensions heretofore used have frequently had broken frames and cylinders. In the new locomotives the frames are heavier and the cylinders have been strengthened. Although the road is comparatively level it has been impossible to haul as many loads in the winter as in the summer, the summer load for the consolidations being 47 loaded cars and the winter train 35. The new locomotive will haul at least 50 cars in winter, and Mr. Lawes informs us that at the time of writing (the middle of this month) these new engines are hauling 56 loads up a 21-ft. grade, and that they are giving good satisfaction. The principal dimensions follow:



Twelve-Wheel Locomotive for the Chicago & Eastern Illinois

Name of builder	Pittsburgh Locomotive and Car Works
Gage	4 ft. 8½ in.
Kind of fuel to be used	Bituminous coal
Weight on drivers	142,000 lbs.
" total	172,000 lbs.
Wheel base, total, of engine	25 ft. 4 in.
" " driving	15 ft. 6 in.
" " total (engine and tender)	53 ft. 7 in.
Frames	4½ in. wide throughout
Heating surface, firebox	207 sq. ft.
" " tubes	2,102 sq. ft.
" " total	2,299 sq. ft.
Grate area	35.70 sq. ft.
Drivers, diameter	54 in.
" material of centers	Cast steel
Truck wheels, diameter 28 in.	Steel tired
Journals, driving axle, size	8½ in. diam., 10 in. long
Driving axles of Cambria steel	Coffin Process
" " journals	8½ in. diam., 10 in. long
Bearings of	Magnus metal
Engine truck axles of hammered steel, journals	5 in × 10 in.
Springs from	A. French Spring Co.
Rods of hammered steel, "I" section.	
Parallel rods with solid ends.	
Magnus metal bearings.	
Oil cups forged on.	
Crank pins of Cambria steel	Coffin Process

Cylinders.

Cylinders, diameter	21 in
Piston, stroke	26 in.
" rod, diameter 4 in. Cambridge steel	Coffin Process.
Kind of piston rod packing	Dunbar
U. S. Packing on piston rods and valve stems.	
Boiler of	Illinois Steel Co.'s steel
" working steam pressure	200 lbs.
" material in barrel	Illinois Co.'s steel
" thickness of material in barrel	9/16 in.
Seams, kind of, horizontal, butt joints, sextuple riveted,	with welt strips inside.
Thickness of tube sheets	½ in.
" crown sheet	5/16 in.
Dome, diameter	9/16 in.
Lagging	Magnesia sectional on boiler, dome and back head
Boiler front and door	Hydraulic pressed steel
Firebox, length	126 in.
" width inside	41 in.
" diameter of waist at front end	64 in.
" ring	Double riveted
" thickness of sheets	1/4 in.
" crown sheets	1/2 in.
" tube sheets	½ in.
" side and back sheets	9/16 in.
" water space, width: front, 4 in.; sides, 3½ in.;	back, 3½ in.
Grate, kind of	Rocking
Cab of	Steel
Pilot of	Wood
Stay bolts, 1 in. diam., all drilled in outer end, ⅛ in. diam. 1¼ in. deep. Radial stay bolts, 1¼ in. diam. Three front rows are sling stays. Fire door, 20 in. diam. inside.	
Tubes, number	296
" material	Charcoal iron, No. 12 W. G.
" outside diameter	2 in.
" length over sheets	13 ft. 6 in.
"	Copper ferrules at back end
Tender frame	10 in., channel steel
Tank capacity for water	4 500 gals.
Tender trucks	Four-wheeled, center bearing, made by Fox Pressed Steel Co.
" wheels	33 in., cast iron
Axles of hammered steel, M. C. B. standard, 5 in. ×	9 in. journal
Water supply	Two Nathan No. 10 injectors
Bell Ringer	Cooke & Strong
Front and back couplers	Tower Automatic Coupler
Steam chest valves	"American" balanced
Guides of hammered iron, case-hardened.	
Sanding devices	Leach
Driver brake equipment	Westinghouse and American combined on all drivers and tender
Air pump	9½ in.

Annual Report of the Interstate Commerce Commission.

The eleventh annual report of the Commission has just been issued. The body of the report fills 150 pages. Following is the principal part of the abstract prepared by the Secretary of the Commission:

The office work of the Commission has considerably increased, the number of tariffs received being 118,700 and the number of certificates of concurrence in joint tariffs 269,048. All these documents were receipted for, examined, compared and indexed. In the informal adjustment of complaints and the general correspondence of the office 123,346 letters have been received and 844,424 sent. The number of documents distributed was 73,570. Hearings during the year have had to do with the practices of 510 carriers.

Import and Export Rates.—Mention is again made of the effect of the Import Rate decision of the Supreme Court, requiring that competition arising in foreign countries or on foreign seas must be considered and given proper weight in determining the proper relations of rates on import and domestic traffic carried between the same points in this country. The freight cost of reaching our various ports from the same foreign port, as well as cost of bringing goods to any one of our ports from every foreign port, is unequal, free from legal restraint, and ever varying, and effect and proper weight cannot be given to competition arising out of such conditions. Since that decision carriers change rates on import traffic as ocean charges vary, without regard to inland rates, discriminations, or preferences, and in disregard of any legal requirement to charge the same rate on import traffic to all persons. The carriers also apply the ruling of the Supreme Court in the Import Rate case to their export traffic, without regard to rates maintained on freight to the seaboard cities for domestic use. Transportation abuses are thus made easy, and convenient means afforded of giving rebates on domestic goods under pretext of carrying for export. The Commission is unable to recommend any practical rule or additional legislation other than that import traffic shall not be carried within the United States at other than the inland tariff governing other freights, and Congress is again appealed to for appropriate legislation.

Powers of the Commission.—The action of the Supreme Court in the Social Circle and the Troy (Ala.)

cases is discussed, with a statement of why the public had believed that a more satisfactory and complete remedy for transportation abuses was provided in the statute, why the Commission had given a construction to the law which the court decided to be erroneous, and why additional legislation should be enacted. Carriers may now establish their own rates and judge for themselves what are reasonable and just, independent of any regulating authority. Without authority to make the first three sections of the law effective in the future, practically all the Commission can do is to inquire into wrongs done in the past and report the result to itself. A suit to recover excess over reasonable rates is not an adequate or equitable remedy. Prevention by fixing and establishing reasonable rates in advance is the only practical legal remedy for extortionate and unjust charges.

To offset the Supreme Court's view of the billions of dollars invested in railroad properties, the Commission calls attention to the public interest in freight charges paid by the people during the fiscal year of 1896, amounting to $786,615,837, and that a very slight change in rates on a staple article amounts to an enormous sum in the aggregate. The railway traffic manager may decree whether an industry shall exist or a locality flourish.

The report shows that damages for unreasonable rates can only be recovered by the one who pays the freight money, while the real loser is generally the producer or consumer. Moreover, if the party injured could sue, his individual interest in the particular case would usually be small, and he frequently would not do so. An individual is not ordinarily a match for the vast power of a railroad corporation. Reparation has only been awarded by the Commission in five cases. This shows how insignificant to those who suffer and complain is the mere right to recover a portion of the freight paid. Cases involving unreasonable rates have usually been brought by a state commission, a freight bureau, or by the Interstate Commerce Commission on its own motion, with a view of correcting the rate schedule to be in future effect, but such bodies would not conduct investigations which could only establish purely personal rights. When the case for recovery of damages gets to the court it involves a jury trial. On grain from Kansas City to Chicago, a Chicago jury may think 20 cents per 100 pounds reasonable, while a Kansas City jury may think 15 cents enough. A cardinal purpose of the act is to secure uniformity of rates, but application of the remedy provided by Congress produces, under the Supreme Court decision, not uniformity and equality, but the direst confusion and grossest discrimination. . . .

Does the United States government desire to deliberately create that condition of things which is little better than legalized brigandage? Instead of saying that the Commission can only regard the past, it would accord more with the intent of the act and be more for the interest of the public and the carriers if inquiries by the Commission looked mostly to the future. The lack of power to prescribe maximum reasonable rates affects orders of the Commission prohibiting discriminations between individuals, commodities, or localities. Here the trader instead of the consumer or producer is more often affected. Usually the only way to correct the discriminations is to change the rate, and there can be nothing in the way of reparation for wrong done in the past, particularly where the case is one of relative rates to different localities, under the undue preference clause of the law. The Commission having no power to prescribe a rate for the future, it may follow that it cannot fix a differential as between related charges.

An example is given of an interstate rate and a local rate fixed by a state commission combined to make a total through rate. The Commission can only order the entire rate reduced. It can not determine how the reduction shall be shared by the different carriers. To enforce such an order it should have authority to determine the divisions between the participating roads.

Enforcement of Orders.—The report next discusses the problem of how the orders of the Commission can be enforced. Under the Constitution the power of the Federal courts is confined strictly to determining whether the rate is reasonable, and they can not go further and determine what would be reasonable.

If a rate is fixed by a commission, the right of judicial inquiry may be secured by proceedings to directly review the order fixing the rate. Most of the decisions have been rendered since the interstate commerce act was passed. A case before the Commission proceeds exactly as it would proceed in court, but its order now amounts to nothing. The carrier incurs no penalty or loss if it chooses to disobey. In a suit brought in court to enforce the order, the testimony must be entirely retaken, and neither party is confined to what was done before the Commission. The court usually decides upon a different state of facts, and when it refuses to enforce the order it apparently decides that the order was wrong, though upon the facts before the Commission it may have been absolutely right. Some effect should be given to the trial before the Commission. The present procedure tends to bring the Commission into disrepute, and is grossly unfair to it and complainants who appear before it. The delay involved in an attempt to enforce an order of the Commission in the courts is unjust and often fatal to regulation. The average time involved has been four years. The power of a regulating body, however limited, should be capable of immediate application.

The carrier has now nothing to lose and everything to gain by continuing to charge the excessive rate. Shippers are also deterred by the delay from bringing complaints, for while the case is pending the carrier may ruin the competing shipper in various ways. If the Commission could grant speedy relief this would not happen. . . . The orders of the English Commission are only reversible as to questions of law, but it might not be inappropriate to provide that orders of this Commission should be reversible by the court both upon the law and the facts. The testimony before the Commission should be the record before the court, and the court should instruct the Commission to take and send up any additional testimony found necessary. Penalties should be provided for disobedience sufficient to make compliance certain. The problem of regulation is important and delicate, but the necessity for regulation is universally recognized. It is resorted to in nearly every civilized country, and most of our states have adopted some such measure. The act to regulate commerce was passed in obedience to popular demand and to remedy admitted evils, and the experience of 10 years has demonstrated the necessity and justice of such an act.

Long and Short Haul.—This section is discussed at length. It is declared that the Supreme Court in the Troy (Ala.) case held that railroad competition at the longer distance point made the circumstances and conditions dissimilar. Very much lower charges for longer distances constituted one of the worst abuses previous to 1887, and this fact was one of the chief reasons for the establishment of the Interstate Commerce law. No English court has ever yet held that the words "same circumstances" in the English act relate to competition, though since our act was passed the English law has been amended, so that in cases of undue preference competition may be considered. If competition justifies the lower long haul charge there is nothing left for the section to act upon. It is hardly correct to say that the Supreme Court disapproved of the views of the Commission, for, so far as appears from its opinion, the court never took pains to inform itself what the position of the Commission had been. It did decide, however, that railway competition creates the necessary dissimilarity in circumstances and conditions, and this virtually nullifies the fourth section. The railroads quickly understood the effect of the decision, for within five days after the Supreme Court read its opinion the Trans-Missouri Freight Bureau (which appears to be a lineal descendant of the Trans-Missouri Freight Association, notwithstanding the anti-trust decision) filed schedules raising rates to intermediate points over more than 100,000 squre miles. It is believed that in no other part of the civilized world is such a practice tolerated. It was the unanimous opinion in 1887 that this evil required special legislation, and must be positively prohibited in the statute.

The railroads duly publish their tariffs, but although railroad managers have loudly protested, since the decision in the Brown case, that they would maintain rates, it is charged and even tacitly admitted by railway officials, that tariff rates are disregarded. In a recent investigation by the Commission, officers of railways engaged in traffic to the Atlantic seaboard, who must have known whether rates had been departed from, testified without exception that they had in all cases been maintained. Nevertheless, the fact is well understood to be otherwise. The large shipper, trust, monopoly, reaps the benefit of these cuts. The small shipper pays the full rate. The honest shipper may be prevented from doing business at all. The same is also true with carriers. As a rule they want to obey the law. Under existing conditions dishonest railway officials and dishonest shippers may compel every competing railway and every competing shipper to be dishonest also or withdraw from the business. How far this outrageous situation extends the Commission has no knowledge, but it is certain that it exists to a considerable extent; and that there is pressing need of a remedy is not denied. The carriers claim that the remedy lies in the passage of a pooling bill.

Pooling.—As to the wisdom of this legislation the Commission is not agreed. Pooling does not appear to be much resorted to in England, and under conditions there existing there is little or no occasion for it. A majority of the Commission think that pooling would improve the rate situation, and the present condition is so disastrous that they would be inclined to indorse in good faith any way out of it; but if pooling produces any beneficial results it necessarily does so at the expense of competition. In view of the whole situation, a majority of the Commission would be inclined to recommend that pooling be tried if suitable safeguards are provided in advance. The members of the Commission are unanimous in the opinion that to overturn the Trans-Missouri decision, to repeal the fifth section of the Interstate Commerce act and enact in its place a pooling bill, would be little better than a crime against the people of the United States, unless some tribunal is at the same time invested with adequate powers of control.

But Congress is not powerless to remedy the existing evil of rate-cutting without granting pooling. One way would be to establish a supervision and inspection of accounts, including, when necessary, the taking charge of one or more stations. That is no more rigorous than the system under which national banks exist. This is not now recommended, however. The Commission does earnestly recommend that Congress undertake the revision of this entire law. The dissenting opinion of Mr. Justice Harlan in the Troy case shows the exact situation. While the Commission can, in a halting fashion, correct some forms of discriminations, adjust differences between carriers and shippers informally, conduct investigations and make reports, and publish statistical information, it has, by virtue of judicial decision, ceased to be a body for the regulation of carriers.

Grain Rates to the Seaboard.—An investigation has been made concerning alleged rate discriminations on grain carried to Eastern seaboard points. The witnesses examined all positively testified that published rates were observed. Some practices were disclosed, however, which deserve consideration by Congress and by railway share owners. Exorbitant sums are paid for transfer service by "belt lines" at Chicago and other Western cities, even when delivery could be made directly to the connecting line without transfer. This is done apparently for the purpose of cutting rates; otherwise it amounts to waste of revenue. Changing the destination, but charging the lower billed rate, is another device. Roads leading east from Chicago to the seaboard have apportioned traffic to different lines according to an award of arbitrators for the Joint Traffic Association. One road which turned over large amounts of traffic to competitors was in the hands of receivers, operating under direction of a United States Court. There are abuses in the carriage of export grain. In one instance grain was carried from the interior to Europe for less than was charged from the same point to New York, and on which the roads received 15 cents per 100 lbs. less than they secured on the shipments only to New York. Complaining shippers are unwilling to furnish information concerning willful violations.

Miscellaneous.—Concerning the penal section of the act, the Commission can only aid the prosecuting officers of the Government to secure evidence. But these provisions have been shown extremely defective, and a revision of the section is urged.

The Commission reiterates its condemnation of ticket scalping.

The report sets forth the unavailing efforts which have been made by the Commission and in Congress to secure uniform freight classification, and describes what has been done by the carriers in that direction. The classification in force in Great Britain was prescribed by the Board of Trade. Voluntary action by the roads is preferable to an arrangement forced upon them by authority. But they are not likely to do anything, and the Commission recommends that the carriers be required to make and adopt a single classification within a year.

Authority to require carriers to make through routes and carry at through rates is urged. The lack of this power, though obviously intended to be conferred by Congress when the act was passed, subjects both carriers and shippers to gross discrimination and prejudices. An amendment is proposed.

Advance figures from the preliminary report on the income account of railways for the year ending June 30, 1897, are given, which show that the gross earnings of 743 railways, representing on June 30, 1897, an operated mileage of 180,127.65 miles; were $1,116,635,999. The operating expenses were $747,589,370, leaving net earnings of $369,046,629. The railways also received $34,166,656 from sources other than operation, so that the total income for the year was $403,213,285. The total reductions from income, including the term interest, rents of leased lines, taxes, and other charges against income, were $347,335,105. The dividends declared amounted to $57,290,579. The deficit from the operations of the year as reported was $1,412,399.

The Commission points out the difficulty of obtaining statistical reports within any reasonable time, through the absence of any penalty for failure to file them within a specified period. An amendment to section 20 is suggested.

The action taken by the Commission in the matter of the construction, publication and filing of tariffs is stated. Many rate sheets are still defective. Some are poorly printed by mimeograph process. The statements in others are vague and incomplete, and are also rendered confusing by frequent modification in the way of amendments, supplements and advance notices. Many joint tariffs fail to show the routes over which they apply, though this could generally be done without much greater expense. The improvement caused by the system of numbering tariffs prescribed by the Commission is noted. The requirement that names of participating carriers shall appear on joint tariffs and notices of concurrence shall be filed by the parties other than the carrier filing the tariff is not properly complied with. Many carriers fail to give legal notice of tariff changes.

Immediately after the Supreme Court decided the Troy case carries from Chicago, Mississippi River and Missouri River points entered upon rate reductions to Denver and other Colorado points without reducing rates to intermediate stations. An example is that the $2.05 first-class rate from Chicago has been cut $1.18, the present rate being 87 cents. Other court decisions discussed are the Grand Rapids Free Cartage Case, the Wight Case, the Joint Traffic Association Case and the Trans-Missouri Freight Association Case.

The New York milk case, where four group rates were prescribed and the order was promptly complied with by the carriers, is noted. It was held in this case that transportation through different States, which begins and ends in the same State, is subject to the act to regulate commerce. Another case in which the Commission prescribed a maximum rate was one of passenger fares between Missouri and Arkansas, and the rate was promptly made effective.

In the Eureka Springs case the Commission held that the rates to Eureka Springs were unreasonable, and recommendations for reduction were complied with.

The proceedings had under the safety-appliance act are stated. Applications were received from 259 roads for extension of time within which to comply with the coupler and train-brake law. For reasons stated the Commission granted the petitioning carriers an extension of two years from Jan. 1, 1898.

Thirty-four cases involving the practices of 273 carriers were investigated during the year, and the basis of complaint in each is set forth. These proceedings involve practices of carriers through about every section of the country, affect many and large industrial and commercial interests, and raise questions under all the regulating provisions of the law. Such general complaint indicates that the regulation now provided by Congress, ineffective though it may be, is nevertheless generally appealed to as the only existing means of relief to prejudiced localities and shippers, and that amendment of the law has become a public question of first importance.

Fifteen civil cases are now pending in the courts to enforce orders of the Commission. The pending criminal cases are stated. The conviction on pleas of guilty of two officers of the Texas & Pacific is noted. They were each sentenced to pay a fine of $4,000 and costs for providing free storage of cotton for a firm in New Orleans.

Additional Legislation.—To give practical effect to the first, second and third sections of the law, which declare unjust and unreasonable rates to be unlawful, and which forbid undue preferences, the Commission recommends amendments to Sections 6, 15 and 16. These relate to the preparation, filing and publication of tariffs, powers of the Commission over rates, and procedure in the courts. Amendments are also proposed for Section 4, the long and short haul clause; Section 20, covering the filing of annual reports; Section 3, as to through routes and through rates, and Section 10, the penal section.

An amendment requiring import and domestic traffic to be carried at the same rates is suggested, but if Congress shall deem it wise to justify higher charges on domestic than on imported traffic, then it is submitted that some provision of law be enacted under which it will be practicable to determine the extent to which discriminations through lower rates shall be made in favor of freights coming from foreign countries.

The "American" Compressed Air Ditcher.

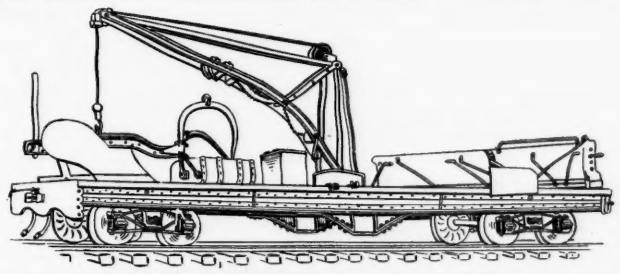
Some months ago we described briefly the railroad ditcher worked by compressed air, designed by Mr. W. B. Doddridge, General Manager Missouri Pacific Railway, and built by the American Steel Foundry Company, of St. Louis. We are now able to give a somewhat detailed discription, with a general view.

The car is 50 ft. long and built entirely of steel. The side sills are plate girders 18 in. deep, each composed of one plate ½ in. thick and four angles 6 × 4 in. The center sills are the same depth and are composed of a ⅜-in. plate and angles, 3½ × 3½ in. This frame is strongly braced by cross bracing and is carried on two American steel trucks. A jib crane 9 ft. high is mounted on the center of the car, having a reach of 14 ft. from the center of the car. It will swing through a complete circle, and like every attachment of the car is operated entirely by compressed air. The cylinder for hoisting, placed beneath the floor of the car, is 12 in. in diameter and has a stroke of 14 ft. 7 in. The cylinder for swinging the crane is also 12 in. in diameter and has a stroke of 9 ft. 5 in. The swinging is done by gearing placed on the mast of the crane which engages a rack attached to the piston rod of the cylinder. For hoisting a wire cable is used, which is passed down through the center of the mast around a sheave, then to the end of the car, around another sheave and then attached to the piston rod of the hoisting cylinder. This results in the most simple construction possible, and one which has the least number of parts to wear out. Compressed air is admitted to both ends of the cylinder, which gives the operator absolute control of the crane and enables him to instantly apply its maximum power.

In addition to the crane cylinders there are four air cylinders, each 8 in. in diameter and 5 ft. 4½ in. long for use as side guides for the attachments to the car.

The air supply for all these cylinders comes from the airbrake on the locomotive and is stored at a pressure of 80 lbs. in four cylindrical reservoirs, each 22 in. in diamter and 10 ft. long, which are secured to the frame beneath the floor of the car.

The attachments consist of a plow, scraper, shoulder former and scoop. In all operations the plow is first used. This is of cast steel, made in one piece, excepting the mold board, which is of heavy boiler plate. It weighs 2,500 lbs. and cuts a furrow 20 in. wide and 30 in. deep. It is attached to the car in four places. The pulling is done by a wire cable hitched to the end of the sill of the car, which is a steel casting having extensions on both ends for this purpose. The depth of the furrow cut is regulated by the crane, which is attached to the end of the beam so that the plow can be run out on the top of the ground. The distance of the furrow from the track is regulated by two struts, one of which is attached to the forward end and the other to the rear end of beam.



American Compressed Air Railway Ditcher—Am. Steel Foundry Co., St. Louis.

One strut is attached to the piston rod of air cylinder, and it will be seen that the operator has absolute control of the position of the plow and the work it is doing.

After the plow has been run over a section in ordinary work the shoulder former is attached and the embankment smoothed and shaped to the desired cross-section. The manner of attaching the shoulder former is somewhat similar to that of attaching the plow. A templet is bolted to the lower edge of the mold board of the shoulder former and carries with it sufficient earth for filling up any low places, and after it has passed over the track is ready for ballasting. On some work the scraper is used before the shoulder former, and with it the earth is thrown up toward the track or away from it, as desired, and in quantities sufficient for giving the shoulder former as nearly as possible the required amount of loose earth for working to good advantage.

One of the interesting parts of the apparatus is the scoop. This is used in cuts where there is not room for throwing surplus earth off at the side of the track and also where the track is being lowered. The plow is first used and then the scoop applied, and in this way surplus earth is carried out to a fill or embankment where it can be used to advantage. The scoop is of steel and holds about 3 cu. yds. of earth. With it and the plow cuts can be excavated to any depth and to a width of 14 ft. from the ends of the ties. Where there is sufficient room a cut is made on one side of the track and the scoop is then thrown over into this cut and the car used for completing the work; but when there is not sufficient room for this the earth is thrown out from between the ties by hand, the track lowered and the scoop used for carrying the earth away. The shoulder former is then used and this completes the work, with the exception of placing the ballast.

The force for working the car consists of the regular crew (a conductor and two brakemen for the work train), one man for handling the air and two laborers for changing the chain hitches. This makes the entire cost for labor about $18 50 a day, and it is claimed that with one car as much work has been done in one day as can be done by 500 men with shovels by the customary methods, thus making it possible for a great many railroads to drain their lines where by hand the cost would be prohibitive. The machine is propelled at a speed of about four miles an hour while working.

Cupped Firebox Sheets.

At the last meeting of the Western Railway Club, Mr. G. F. Wilson, Superintendent of Motive Power and Equipment, of the Chicago, Rock Island & Pacific, described the locomotive firebox with cupped sheets adopted as standard by that road. This method of cupping consists of indenting the sheets away from the fire around the staybolts, the centers of the bolts coinciding with the centers of the circular indentations. These depressions are about 3 in. in diameter at the outer edge and are sufficiently broad at the bottom to permit of the staybolt head being formed without trouble; the depth of the cup is from $\frac{7}{16}$ in. to $\frac{1}{2}$ in. The side and back firebox sheets are cupped in this way about all staybolts excepting a few of the top rows, but the outer shell sheets are plain. The additional cost due to cupping varies from three to five dollars for each firebox, depending upon its size.

At present 45 Rock Island engines are fitted with fireboxes in which the sheets are cupped, some having been in service over two years. Mr. Wilson states that in this time there has not been a broken or leaky staybolt in any of these fireboxes, but that much trouble was formerly experienced when plain sheets were used in the ordinary manner. If the leakage around the staybolts can be prevented it follows directly that the firebox sheets will be less liable to corrode and crack.

The reasons given why the cupped sheets give better service are that the staybolt heads are set back from the fire and that a certain elasticity is given to the plates by the cupping which causes the staybolts and plates to follow each other during expansion and contraction. Where plain plates are used, in the usual way, they are subjected to stresses around the staybolts which are set up at the time the bolt heads are formed; also the staybolt heads project into the firebox and are heated to a higher temperature than the surrounding plate; this gives rise to unequal expansion and contraction of the plates and bolts which results in leakage and cracked plates.

Mr. Wm. Garstang reported that a firebox 108 in. × 42 in., wide with cupped sheets, has been in service on the Cleveland, Cincinnati, Chicago & St. Louis 15 months, and there has not been a single leaky staybolt in that time, while fireboxes constructed of plain sheets in the same service give much trouble from staybolts leaking.

The cupped firebox is the invention of Mr. Joseph Cour, Foreman of the Chicago, Rock Island & Pacific boiler shop at Chicago, and the patents are owned jointly by Mr. Cour and Mr. Wilson.

It would appear that a simple and inexpensive means has now been found for overcoming some of the most troublesome features of the locomotive firebox, namely, leaking and broken staybolts and cracked firebox sheets.

Mohler's Uncoupling Device for Passenger Cars.

Mr. A. L. Mohler, President of the Oregon Railroad & Navigation Co., has lately received a patent for an improved apparatus for uncoupling passenger cars, which is illustrated in the engravings. The device has been for some time in use on Mr. Mohler's private car.

The pull on the chain to open the coupling is effected by repeated strokes of the lever *H*, toward the position *X* (Fig. 1), which, acting through the ratchet and pawl *A* (Fig. 2), wind up the chain on a drum fixed to the shaft *E* (Fig. 2). The latch-rod *G* is pressed upward by the spiral spring *S* and the pawl is thereby kept in contact with the teeth of the ratchet wheel. Pressure on the grip at the top of the rod lifts the pawl, and when the lever *H* is thus released the operator, by pulling it to the position indicated by dotted lines at *X*, causes the pawl *A* to engage with the gravity lock *B*, thus releasing the drum, allowing the chain to slacken.

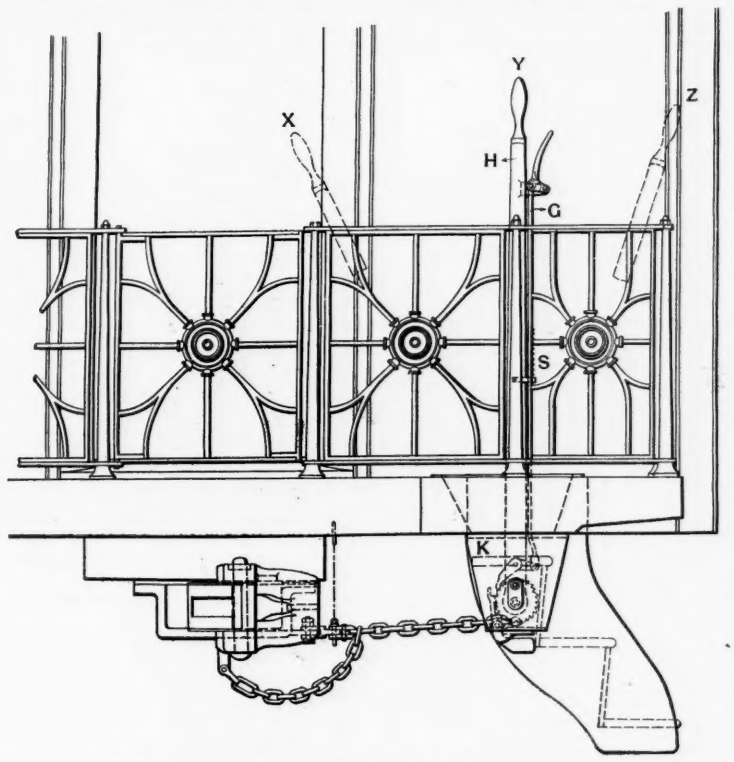


Fig. 1.—Mohler's Uncoupling Device for Passenger Cars.

Heating Passenger Cars.

In a paper, "Heating Passsenger Cars," presented before the Western Railway Club at the November meeting, Mr. Wm. Garstang introduced the subject by referring to the difficulties encountered in attempting to heat railroad cars so as to suit all classes of passengers, and stated that the tendency is to keep cars too warm. Cars were first heated by means of wood stoves then coal-burning stoves were used, followed in turn by downdraft stoves and Baker heaters, until at the present time steam or a combination of steam and water is quite generally used. It was suggested that possibly electricity might succeed steam as a heating agent. The main points in the paper are as follows:

The return system of heating theoretically presents itself as being the most economical and rational of all, because if correctly worked out in detail it may be operated with less steam and also no steam escapes under and around the coaches. The return system is not yet perfected, and so far it has not been a complete success.

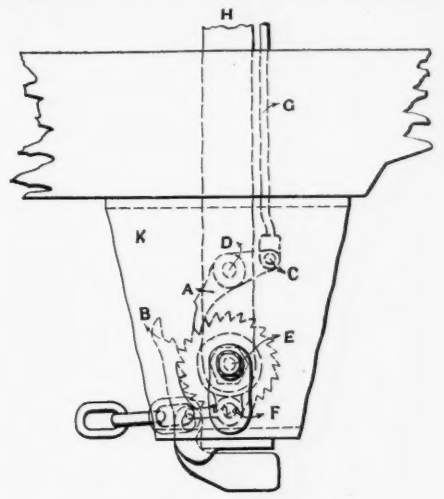


Fig. 2.—Detail of Uncoupling Device.

Some objections to this system are that it is very complicated and requires for its operation many valves and cocks; the condensed steam in the return pipes is liable to freeze, as it is under a partial vacuum, and consequently at a low temperature; it is difficult to regulate the heating of a long train of cars, as the cars do not heat alike on account of differences in construction, and with the return system it seems that the steam pressure must be uniform as the pipes are continuous. With this system the condensation cannot be returned directly to the tank without using more steam than is justifiable; a vacuum pump has been proposed in connection with the return system, but a satisfactory device has not as yet been perfected. Notwithstanding these drawbacks, Mr. Garstang thinks the return system the rational one, and that it should receive the most consideration.

Next to the return system the storage system is probably to be desired. This consists virtually of straight steam used with a single cylinder filled with corrugated sections of terra cotta or with a double cylinder, the inner one containing a strong solution of salt water. In case the steam supply is cut off, the heat from the hot water cylinder or from the hot terra cotta will furnish heat for some time, and the system also permits of a uniform regulation when the cars are in service.

There are a number of combined steam and water heaters, such as the commingler, the duplex coil and the steam jacket heaters. The heat distributed in this indirect manner is more regular than by the direct steam system, but objection to most of them is found on account of their complexity and liability to become frozen when cutout at such points as have no inspectors to care for them, or when they are not fitted with perfectly automatic steam traps. It requires from 50 to 75 lbs. steam pressure to successfully heat a long train by means of the steam and water system. This is too large a demand on the locomotive boiler, besides being expensive in the way of wearing out steam hose, and it is also dangerous to carry so high a pressure. However, for sleeping cars, private cars, dining cars and some parlor cars, it is desirable to use a system of this kind, and such a one should be selected that will permit of steam and fire being used together in the heater without one destroying the efficiency of the other. As the condensation will vary greatly in a system using steam in connection with the Baker heater, it is quite necessary to use automatic steam traps.

The plain pipe or direct steam system seems to be the most satisfactory for the ordinary class of cars, because it is simple in construction and manipulation, quickest in results, most economical to maintain, has the lowest first cost, and at the same time it meets all the require-

(*Continued on page* 912.)

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Receipts of wheat, corn and oats at New York for the five months ending November 30 amounted to 93,267,131 bushels, but the Erie Canal boats brought only about one-sixth of the total or 15,355,000 bushels. The canal has kept down the rates, and has thus silenced the loud complaints of last spring concerning the diversion of export grain to Baltimore, Newport News and elsewhere; it has accomplished this, however, not by actually carrying a large share of the grain, but by helping to compel the railroads to reduce their rates. We say "help," for it is by no means certain that the railroads would not have compelled one another to carry at cost, so desperate seems to be their purpose to keep up their gross earnings. The New York Central and the Erie have brought during the five months, mostly from Buffalo, 48,392,650 bushels of the three grains named, or more than three times as much as the canal-boats. Of wheat, the Central alone brought nearly five times as much as the canal, and of oats three times. Of corn the canal got more than either road, but the two roads together beat the canal. The figures are for the five months (bushels):

	N. Y. C.	Erie.	Canal.
Wheat	14,656,625	5,429 275	3,165,000
Corn	6,518,025	7,701,525	9 782,800
Oats	6,806,400	7,280,800	2,407,200
Total	27,981,050	20,411,600	15,355,000

It is said that the railroads accepted as low as 2½ cents a bushel for a good deal of this grain, or, say, about two mills per ton per mile. Reports from Chicago indicate that the railroads are now tumbling over one another to get the privilege of bringing grain (and provisions also) 900 or 1,000 miles at rates almost or quite as low as this per mile.

As navigation is closed and grain is still coming from the farms in enormous quantities they will, doubtless, be able to get their fill; but why such great reductions are necessary when there is said to be freight aplenty for every car that can be furnished is one of the mysteries that no one outside a traffic manager's office can solve.

Second-Class Sleeping Cars.

Tourist sleeping cars are again the subject of a large amount of discussion among Eastern passenger men. The practice of regularly running these cars, long in vogue in the West, seems destined to spread eastward, but it moves slowly and with halting steps. Cars have been run regularly from Boston to Chicago for a long time, over the Canadian lines, the Fitchburg and the Boston & Albany, four lines in all; but not from New York. A few months ago it was proposed to put on California cars (or, rather, routes) begining their trips at Pittsburgh, Pa. This led to the establishment of a new line from New York by the Erie, and then one from Philadelphia by the Lehigh Valley; and now the Baltimore & Ohio announces a through car (not merely a through route) from New York to San Francisco. It is no disadvantage—perhaps an advantage—to] change cars once or twice on the journey, but it is necessary to run the car through to make the advertisement thoroughly attractive. All these cars run once a week; they can be run oftener if there is a demand and can be taken off altogether if there is no demand, so that the experiment is not costly. The Pullman Company furnishes, we believe, the cars for all the routes above named except the Canadian Pacific and the Boston cars that go over the Vanderbilt lines.

The persistence with which these cars assert a place for themselves raises the question whether they ought not to be recognized as a regula part of the business. Most of the more conservative traffic officers discountenance them be cause, they say, the second class ("tourist") business is fostered only by roads which desire to demoralize, or at least disturb, the first-class traffic. This accusation is, doubtless, true, to the extent that the cars are run most persistently by roads which get a small share of the through business, want more, and see in this cultivation of the second-class field a way to get more; but why is not that a legitimate reason for disturbing traffic? It is just as legitimate as the disturbance in the other direction that has made such considerable progress in the last few years, the regular running of all-stateroom sleeping cars. In one sense these two changes are in the same direction; they give a few passengers more nearly what they want; but they differ markedly in the fact that with the second-class car the railroad increases its profit per car, while with the other it decreases it. The tourist car weighs less, costs less per mile for rental and averages more passengers per car (or should do so if well managed). If there are people who wish to use such cars and if it is right for railroads to practice economy in the passenger department as they do in the roadway and mechanical departments, there would seem to be no good reason why they should not be run. It cannot be that California passengers are the only ones who want to save a dollar a day when they travel.

At the same time, it will be a pity if all the roads run tourist cars out of New York, as the gossips predict—say five or six a week—when there is business enough for only one or two. But as it would be a crime, under the Sherman law of 1890, for two roads to agree to alternate their cars or to divide the business, nothing but wise moderation on the part of the General Passenger Agents can prevent a waste of money.

The Chapsal Electro-Pneumatic Brake.

There is a class of inventors, who, either without informing themselves as to work already done, or without taking advantage of past experience, persist in inventing and exploiting machines and apparatus which have already been tried and found unsatisfactory. Electrical apparatus for applying and releasing air-brakes on railroad trains has offered a wide and attractive field for this class of inventors. In this issue is given a description of such a scheme, the Chapsal electro-pneumatic brake, which is receiving some attention in Europe. Our chief object in presenting this description is to show the futility of inventing and re-inventing electrical apparatus for working the air-brake. While we can scarcely hope that the number of such useless inventions will decrease, yet possibly by reviewing the early history of the air-brake in this country our home readers may be benefited by having their memories refreshed. Our foreign readers may also learn how greatly the present quick-action automatic air-brake is valued in this country, and what are the reasons for its universal adoption.

In the Burlington brake tests in July, 1886, two classes of brakes were represented, continuous air-brakes and buffer brakes. These tests demonstrated first, that buffer brakes were not suitable for use; second, that with the type of continuous brakes tried with 50-car trains, shocks of great violence were produced by the *successive* application of the brakes, the brakes being applied on the forward cars about 17 seconds before the brakes on the rear cars took effect. In order to successfully brake trains of 50 cars without injuring cars and lading, it was concluded from the first series of tests that the car couplings should have little or no slack, and also that the brakes should be applied simultaneously throughout the train.

So clearly were these points brought out that in the second series of tests, made at Burlington in May, 1887, the several competitors brought forward devices especially intended to eliminate the shocks. Only the continuous type of brake was entered in the second contest. The Westinghouse train was fitted with the first style of quick-action triple valve and it was also equipped with electrical appliances adapted to those brakes; the Eames train likewise had electrical attachments for applying the brakes. In both of these electricity was used as an auxiliary or in addition to the braking device, which was complete in itself. In the Carpenter electro-air brake and the Card electric brake electricity was entirely depended upon for the proper operation of the braking mechanism. These were the only important brakes tested.

In the May tests the Card brake failed through mechanical defects in its construction rather than defects in the electrical apparatus, but the train was early withdrawn from the competition. When the Westinghouse quick-action triples were used alone the tests showed that the shocks arising in emergency stops with long trains were not eliminated. Stops were made in the shortest distances with the Carpenter and Westinghouse trains when the brakes were applied by means of the electric apparatus, and also stops made in this way were free from shocks.

For some days many of the best men present felt that the plain air-brakes were doomed, along with the buffer brakes, and that electrical apparatus must be introduced. How strong was this opinion can be learned from the first conclusion of the report of the Brake Test Committee that "the best type of brake for long freight trains is one operated by air and in which the valves are actuated by electricity." This opinion was also held by some able writers for the tec hnical papers, but in these writings we find some doubt expressed as to the serviceability of electric appliances for every-day use on account of the greater chance for sudden failures. That there was reason for this doubt was shown in one test of the Carpenter train, where, on account of a failure of the electrical apparatus while descending a grade, the train had to be stopped by the hand brakes. However, at the close of the Burlington tests the consensus of opinion was strongly in favor of electrical appliances for operating air-brakes.

The question of the necessity, or even the desirability, of an electric complication of the air-brake was settled a few months after the Burlington brake tests when Mr. George Westinghouse brought forward the improved quick-action triple valve. With a test train of 50 cars fitted with the new triple valves, over the course at Burlington in September, 1887, it was repeatedly shown that such a train could be handled in emergencies without shock by the use of the air alone. During the fall of 1887 this test train was taken to all the principal railroad centers in the country and the operation of the improved brakes was witnessed by many and met with universal approval. It might safely be said that since the introduction of the improved quick-action triple valve, the use of electric appliances for air-brakes has not been considered in this country.

Returning to the Chapsal brake, this device or aggregation of devices suggests certain things that might be done through the combination of an air-brake and an electric brake, and some of these features are at first glance attractive. To intelligently arrive at the comparative merits of the system it is necessary to weigh its advantages against the disadvantages. The type of air-brake which has come into most general use is the Westinghouse quick-action automatic brake, and the merits of the Chapsal system may, therefore, be properly compared with those of the Westinghouse system.

It is claimed for the Chapsal system that a shorter stop is obtained because the brakes are applied to all the cars more quickly. Let us consider whether this claim is justified. It is shown that the electric application of the brakes occurs through a series of vibrations of the triple valve mechanism, and it is stated that the time required for a full application is but three seconds. Some portion of this time is necessarily occupied in producing the initial vibration of the triple valve mechanism and in discharging sufficient air from the auxiliary reservoir into the brake cylinder to force the brake cylinder piston out sufficiently far to take up the slack of the brake gear, and bring the brakeshoes in contact with the wheels. It may safely be said that this period of time cannot be less than one-half second. The beginning of the application of the brakes to the wheels, therefore, occurs 0.5 seconds after the movement of the handle of the engineer's brake valve, and the brakes are applied with their full pressure three seconds after this movement. The effect is therefore approximately the same as though a full application of the brakes were instantaneously effected at the average of these two times, or 1.75 seconds after the application movement by the engineer. In the public air-brake trials on the New York Central and Hudson River Railroad, conducted by Mr. P. H. Dudley, in September, 1892, it was demonstrated (*Railroad Gazette*,

Feb. 24, 1893), that the effect of the emergency application of the Westinghouse quick-action brake on a 50-car train is the same as if an instantaneous full application occurred on the first car in 0.57 seconds and on the fiftieth car in 2.94 seconds. The effect on the whole train, therefore, is the same as if an instantaneous full application of all the brakes occurred 1.75 seconds after the application movement by the engineer. Clearly, therefore, nothing is gained in the speed of brake application by the Chapsal device.

On the other hand, the Chapsal device discharges the train pipe air into the atmosphere in applying the brakes, where its power to do effective work is lost, while the quick-action brake discharges the train pipe air into the brake cylinder, where its power greatly increases the stopping efficiency of the brake in emergency applications. We have recently drawn attention to the emergency feature of this brake in discussing the accident at Garrison, but its importance in this connection justifies further consideration. It is a well-established fact that the maximum pressure of the brakeshoes upon the wheels must be so limited in regular service that sliding of the wheels shall not occur. It is equally well understood that in impending danger it is of the highest importance that the pressure of the brakeshoes on the wheels should be greater than can be tolerated in ordinary train working. In the use of the Chapsal system no greater brakeshoe pressure can be obtained in emergencies than that available for ordinary service, while the Westinghouse brake causes a greater brakeshoe pressure in emergencies sufficient to bring the train to a stop in about one-fifth shorter distance than would occur if the train pipe air were discharged into the atmosphere instead of into the brake cylinder. The emergency stopping efficiency of the Chapsal is therefore materially inferior to that of the Westinghouse system.

Another advantage claimed for the Chapsal system is that the release of the brakes, as well as the application, may be graduated. To what extent this is an advantage is not demonstrated. If it could be utilized without seriously complicating the air-brake system, it would probably be a desirable feature; but there is no such demand for a graduated release as would warrant any considerable complication.

Still another advantage claimed for the Chapsal system is the ability of the engineer to release the brakes on the whole train, should the train pipe or a hose be ruptured, or upon the forward section if the train is parted. Instead of being an advantage, this would appear to be one of the most dangerous features of the system. Any rupture of the train pipe or its connections entirely prevents the recharging of the brake throughout the train with air pressure. If the brakes be thereafter released in any manner, a materially diminished stored air pressure is left for each succeeding application of the brakes, and it would be an urgent invitation to disaster to permit a confused engineer to release and re-apply the brakes when his power to recharge them is cut off. The only avenue to safety lies in a prompt stop of the train and in such a repair of the ruptured part that all the operations of the brake system shall again be under the full control of the engineer.

The disadvantages of the Chapsal system appear without a difficult search. In addition to the apparatus of the automatic air-brake system, two electric valve mechanisms, each as complicated as a quick-action triple valve, are required upon each car. In addition to the line of train-pipe throughout the train, two electric wire systems, with suitable coupling connections at each end of each car, are required. The difficulty of maintaining proper insulation, to say nothing of the cost and annoyance of the electric circuits, is practically prohibitory. If the wires of the release circuit should be crossed on the locomotive, an attempt by the engineer to apply the brakes would be frustrated throughout the whole train, because of the fact that the passage from the auxiliary reservoir to the brake cylinder on each car would be effectively closed; nor would the engineer be given any warning that such a condition existed. If the application circuit should become grounded at any point on the train, electrical application of the brakes would be cut off from all cars to the rear of that point. In an emergency application, this condition would be productive of the most severe shocks. It is a generally conceded fact that the proper operation of such an important safety appliance as the air brake upon railroad trains cannot, with the constant vibration, jolt and concussion of railroad train service be safely entrusted to an electric circuit.

The Chapsal system is interesting because of the features in air-brake operation which it suggests; but the fact should not be overlooked that both a graduated release and the ability (not present in the Chapsal system) to recharge the auxiliary reservoirs throughout the train may be secured by the simple expedient of introducing an additional line of train pipe throughout the train. This would involve none of the difficulties and dangers incident to the introduction of electric circuits. The fact that no railroad cares to complicate its brake apparatus by the introduction of an additional train pipe for this purpose is pretty good evidence that the advantages to be gained are not regarded as of sufficient importance to warrant such complication, when an air-brake system with a single line of train pipe so satisfactorily fills the requirements.

Recent Acceleration Tests.

Since the publication of the results of the acceleration tests made at Schenectady in September last (see *Railroad Gazette*, Oct. 1), the subject has received considerable attention in the technical papers, and inasmuch as standard formulas have been repeatedly misused it might be well to call attention to some errors in order that the reader may not be further misled. To better understand the questions at issue we give briefly an account of what has already been done. A special car was fitted with four 50-H. P. motors (one on each axle), and a series of runs was made in which the velocities were noted at the end of each five seconds; a curve was drawn through the determined points and this curve was compared with curves previously obtained from tests on suburban and elevated railroads. These are shown in Fig. 1.

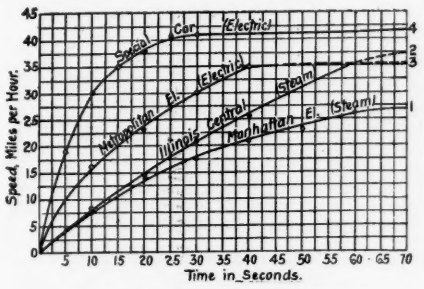


Fig. 1.—Special Acceleration Tests.

It should be noted that in this special test but one car was used, whereas in the others two, three or four cars made up the train, so that the Schenectady test simply shows what could be done if required, the comparison being more entertaining than instructive. In order to obtain the tractive effort, the speed in miles per hour and other quantities it was necessary to use certain formulas. In order to do this the authors of the articles appearing in *Engineering News* and the *Street Railway Journal*, and reprinted in other journals, went back to the fundamental equation: F (drawbar pull) = M (mass) × a (acceleration), in which

$$M = \frac{w}{g} = \frac{\text{weight}}{32.16}$$

and the acceleration equals the final velocity divided by the time and the final velocity equals twice the total space, s (in feet per second) passed over in a given time t, divided by the time in seconds. Substituting then we have

$$F = 2\frac{s\,w}{t^2 \times 32.16}$$

The last formula was put in a convenient form, so that the tractive force per ton could be directly determined by substituting 2,000 w for w and reducing to the form,

$$F\,(\text{per ton}) = \frac{s}{t^2 \times .00804},$$

which expression was used in the discussion. This last form will be unintelligible to many, inasmuch as w has disappeared.

The formula used to determine the speed in miles per hour in terms of the distance run in feet and the time in seconds, was based on the same supposition as the formula for tractive effort, namely, that the acceleration was constant. The point we wish to emphaize here is that these and other formulas used hold true *only* when the rate of change of velocity (the acceleration) is constant. It has been claimed, however, by some that the acceleration is practically constant for an electric car when starting; but in order that this be true, we must have practically the same conditions as in the case of a body falling in a vacuum. (A heavy body falling in the atmosphere gives practically the same results.) If we record the velocities after equal intervals of time on a series of equally spaced ordinates perpendicular to the abscissa representing time and pass through these points a line the result will show at a glance the acceleration. In this case it will be a straight line. Similarly, when a train is starting, if the curve that expresses the relation between velocity and time is a straight line, the acceleration is constant. Observe in Fig. 1 that the curves are straight for but a small portion of the distance recorded, and while the above formulas will hold true for a part of the distance run, yet invariably they would lead to incorrect results unless it is accurately known when the acceleration changes, and this is mostly a matter of guesswork. In Fig. 2 we have plotted the observed velocities of the special acceleration test up to 25 seconds. The amount of curvature becomes more apparent here because we have stretched out the time ordinates. From the origin o we have drawn oa, ob, oc, od and oe. Suppose that it is desired to find the drawbar pull at the point e for any special curve, knowing w, s and t. We take the form of the equation as deduced above from the fundamental equation and substitute the known values, but it should be noted that when we have obtained a result for

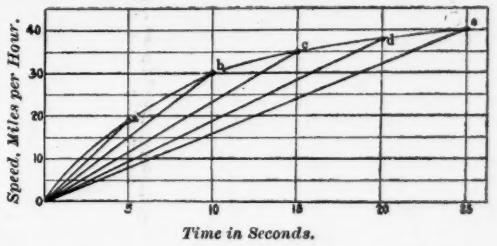


Fig. 2.—Velocity Curve for Schenectady Test

the point e we have worked on the supposition that the velocity increased uniformly as denoted by the line oe. It requires no proof to show that this is erroneous. With this curve, the error will become less and less as we approach the origin. So it might be shown that the other formulas have been used incorrectly. For instance, Fig. 3 shows the plotted results of tests recorded in Fig. 1. Inasmuch as the distances passed over after the observed intervals of time were not recorded in the tests, it was necessary to reduce the speed curve on a time base to one on a distance base, and this was shown by means of a simple formula, which would apply, however, only when the acceleration was constant. The dotted curve 5 indicates what this should have been if the transformation were made correctly, and the following table will show this error more strikingly than does the diagram:

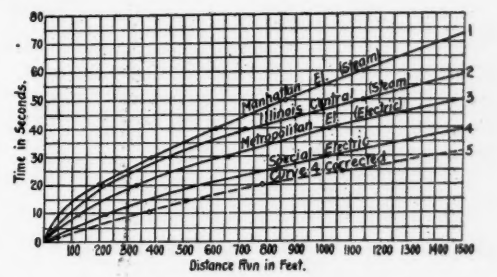


Fig. 3.—Curves Reduced to a Distance Base.

Time in seconds.	Space in feet = By constant acceleration formula.	Space in feet = By Parke's formula.
5	70	84
10	219	374
15	385	406
20	566	779
25	620	1,070

The results in this last column were deduced by Mr. R. A. Parke from the following formula derived from the observed velocities: $s = 82.043\,t - 1703.3 \log. \frac{9.011 + t}{9.011}$ where s is the space passed over in feet per second and t the time in seconds. The reader is cautioned that, while this form of expression for the space, or distance traveled, is of general application, the constants here employed were determined from the observed condition of this particular case, and are not applicable to other conditions. Velocity curves, such as are shown in Fig. 1, are customarily treated, when empirically formulated, as though they should be considered as portions of parabolas, while the above formula more accurately treats the curve as a portion of an equilateral hyperbola. While the derivation of this final form of Mr. Parke's equation used above might be of interest to some of our readers, it involves considerable mathematics that would be unprofitable to give here.

In this connection another interesting fact might be observed. From the well-known expression

$$\frac{d\,s}{d\,t} = v,$$

which is of universal application to any motion of a mass,

$$\int d\,s = \int v\,d\,t,$$

which must be interpreted to mean that the area enclosed between any two time ordinates under a velocity curve, such as those shown in Fig. 1, is equivalent to the distance traversed during the interval between the corresponding times. Thus we might take a planimeter, find the area under the curve for the special acceleration test and plot the curves in Fig. 3 from the results obtained.

The reader may inquire if we have no satisfactory solution for such problems as the one under consideration. In a word, it might be said that the lack of reliable experimental data covering all conditions prevent anyone establishing a simple standard formula that will be reliable in all cases. The same holds true in a large measure of retardation, and here again the formula used by

Mr. Potter is misapplied and gives only the roughest approximations.

It might be added that the most satisfactory results are obtained in cases similar to the one under consideration by making, where possible, very accurate and complete records and plotting the distance passed over, the drawbar pull and other facts from the observed data. Of course where but one car is tested by itself the tractive effort cannot be determined in this way. We have not tried to exhaust the subject, having touched only the surface.

At the hearing on the proposed anti-scalper law before the Senate Committee at Washington, last week, the principal speaker was George M. McKenzie, a Chicago ticket broker. He presented the usual arguments, and estimated that the amount saved to the people annually by the ticket brokers of the United States was $5,875,000. He said that the principal supporters of the pending bill were the Vanderbilt lines, the Southern Railway, the Southern Pacific, the Chicago, Milwaukee & St. Paul, and the Atchison, Topeka & Santa Fe. He said that three of the railroads to St. Paul were practically supported by the scalpers. "Two of them," he said, "would not be able to run through trains without the aid of the brokers." The most interesting statement made by Mr. McKenzie was that 95 per cent. of the business done by ticket brokers was in tickets bought of the railroad companies. In this statement Mr. McKenzie probably proved too much; more than will be good for his own cause. One of the main arguments of the railroads in favor of the suppression of brokerage is that the existence of these speculators is an important factor, if not the direct instrumentality, in almost every demoralization of passenger rates. The stronger and more reputable roads are constantly trying to prevent demoralization, while the weaker roads and unprincipled traffic managers encourage the brokers, and thus provide themselves with a convenient agency by means of which they can at any time cut rates surreptitiously. To the 95 per cent. named by Mr. McKenzie must be added the fraudulent tickets, stolen passes, etc., which railroad officers are constantly discovering in the hands of scalpers' customers, so that the amount of what the brokers call their legitimate business, the business of helping out travelers who have concluded that they do not wish to complete journeys on which they have started, must be exceedingly small. If the members of Congress are amenable to the plain business argument that passenger rates ought to be public, uniform and stable, they can hesitate no longer, for they have now the same testimony from both sides. It goes without saying that the existence of brokers' offices tends to foster secrecy and irregularity. The only reason that weak roads sell to scalpers is that they are ashamed or afraid to make at their own offices the reductions necessary to get the business.

Massachusetts has a safety-appliance law, similar to the Federal law, and on Monday of this week the State Railroad Commissioners gave a hearing at Boston to the Boston & Albany, the Fitchburg, the Boston & Maine, the New England, the New York, New Haven & Hartford and the Central Vermont railroads on their collective petition that the provisions of law relating to the use of couplers and brakes be modified so that cars need not be equipped for two years yet. The Massachusetts law was passed in 1895. It was argued that as the Interstate Commerce Commissioners were to postpone for two years the time for the enforcement of the Federal act of 1893, the Massachusetts Commissioners should do likewise. Charles T. Baker appeared for the trainmen's organization and advocated the petition. There was no opposition. Railroad Commissioner Kayler, of Ohio, has asked the governor of that state to recommend the postponement of the date for equipping cars with automatic couplers in that state. The Ohio law requires cars to be equipped by Jan. 1, the same as the original Federal law, and the same as the laws of Massachusetts and New York, but the Commissioner has no power to suspend the law or to change the date. The New York Commissioners gave a hearing Dec. 21, but deferred their decision.

The Railroad Commissioners of the state of New York have made a report on the Garrison accident. The report sums up and reviews the testimony and therefore is of some value as a record. The final conclusions are that the train was wrecked by derailment, which destroyed the embankment, or that the embankment gave way and threw the train into the river. This seems to be a safe and obvious position to take. The Commissioners recommend that wrecking tools be carried in the middle of the car instead of at one end, that the force of track walkers on the Hudson River Division be increased so as to provide a constant and efficient system of patrol, and that all railroads in the state having roadbeds on embankments alongside of water courses should give careful inspection and provide for careful maintenance of such embankments. In all this the Commissioners do not propose to criticise anything that the New York Central Company has done or has not done, but obviously they feel bound to recommend something, and are at a loss what to recommend. In other words, except as a mere record of the substance of the inquiries made the report has no value except a negative one—to say nothing is proved.

Heating Passenger Cars.

(*Continued from page* 909.)

ments when properly constructed and applied. When constructed so that each side can be operated independently or together, and when proper drainage and automatic traps are provided, the direct system is a satisfactory arrangement. A train of 12 or 15 cars can be heated with a steam pressure of from 20 to 25 lbs. per square inch.

Aside from the actual heating service, the principal features of any system are as follows.

The hose couplers between the cars; the control of the steam in the train pipe; the regulation of the supply of heat in the car; the method of disposing of condensation from the pipes inside the car, and from the train pipe and couplings.

There are but two styles of steam hose couplers in general use, and these are interchangeable, which simplifies the interchange of cars. One of these has a small automatic drip valve at the lowest point, which is closed by the pressure of steam on the train pipe, and opens when the pressure is withdrawn. This has been found to be a desirable feature.

Plug cocks for controlling the steam in the train pipe have been generally used until quite recently, and are unsatisfactory on account of the leakage past the cock into the cold pipe, where it freezes. It is better to use a single train-pipe valve which will shut off the steam either way. It should be located near the center of the car in such a manner that it can be operated from the inside.

The disposition of condensation is probably the most important factor of any steam heating system. It is best to dispose of condensation automatically if possible, as such an arrangement is more efficient and economical, a lower steam pressure may be carried, and it permits a better regulation of heat in the cars. Water at a temperature above 180 deg. Fahr. should not be discharged from the radiating pipes. Automatic relief valves in the couplings are desirable for disposing of condensation at points where otherwise trouble will arise.

Still another point at which condensation will give trouble unless cared for automatically is in the train pipe itself, particularly at the rear of the train. Any train valve or other device placed on a train pipe under a car should be provided with a simple automatic trap attachment for discharging the condensation which collects in the train pipe.

In conclusion, no matter which system is used, attention must be given to the drainage, and such pipes as contain condensation should not be located beneath the car. Avoid the use of plug cocks. In piping baggage, mail or express cars, do not place the piping too near the sheathing as it will likely blister the paint on the outside of the car. Train crews should be educated to know just what degree of heat is preferable, and a thermometer should be permanently fixed in each car; if all the regulating valves are placed inside the car within easy reach, there should be no trouble in maintaining a proper temperature in passenger cars under all conditions with the direct steam system.

The following extracts are from the discussion:

Mr. T. A. Lawes (C. & E. I. R. R.): We have three styles of steam heat equipment in service. The direct system, with traps, gives the best results in general passenger service where numerous stops are made and the doors opened frequently, and it should be used with baggage, express, mail, smoking cars and coaches.

The storage system of heating is used in our suburban service, and in the absence of proper terminal facilities for heating coaches we find the storage system well adapted for this service. We get good results with the duplex coil system of heating on dining cars, business cars and sleeping cars. In a system where duplex coils are used in Baker heaters, it gives good service only when the cars have double windows and compartments at the ends, and aisle doors.

Mr. James F. McElroy (Consulting Engineer, Consolidated Car Heating Co.) Tests were made several years ago to determine in what way train pipes freeze when the steam is cut off by means of a cock or valve. It was found that with a badly leaking cock, it was impossible to freeze up the train pipe; with cocks which leaked very little, ice formed in the bottom of the pipe beyond the cock. Cocks which did not show the slightest indication of leakage, either of steam or water, were connected in the train pipe, and it was found that after several hours a frost-like coating of ice formed concentric with the pipe beyond the valve, and after about 10 hours it was impossible to force steam through the pipe using a pressure of 70 lbs. per square inch. The leakage in this case was invisible, but, nevertheless, sufficient to close up the pipe in the course of time. No valves were found which did not show a gradual formation of ice beyond the valve due to this invisible leakage.

The paper mentions as a remedy the placing of a thermostatic trap in the train-pipe valve and on the steam-heated side. This will not meet the case at all, as the trouble is in the rear portion of pipe, which is not steam-heated, and the trouble occurs because it is not heated. With a slightly leaking valve the leakage under the conditions of service will be found to be steam, not water, and it is the question of the leakage of steam into the cold portion of pipe that must be provided for. A trap placed on the cold side of the train pipe would not meet the difficulty.

The difficulty of forcing steam through long trains is due first to poor pipe fitting and second to the method of operating the heating apparatus. Every elbow in the train pipe offers as much resistance as 15 ft. of straight pipe, and as few elbows should be used as possible. Also by reaming the pipes where the joints are formed the internal resistance can be considerably reduced. Trainmen should not open wide all the steam valves, but the valves admitting steam to the forward cars of the train should not be opened more than one-eighth of a single turn, while at the rear this opening may be increased slightly until the train is heated. If all valves are opened wide there will be two 1-in. valves open to the heating apparatus in the first car and but one 1⅛-in. opening through the coupler to the second car. About two-thirds of the total flow of steam will therefore pass into the heating apparatus of the first car, and one-third back to the other cars of the train; the same holds on the remaining cars. While the forward cars become too hot, the rear cars will not receive sufficient steam, and to cause the steam to reach the rear cars considerable steam pressure will be required at the locomotive.

The most important question with direct steam is the regulation of the temperature. The valves commonly used to admit steam to the heating apparatus are so large that it is impossible to set them so as to give the proper flow at times, when but little heat is needed. Certain regulating valves give the maximum and minimum flow of steam within a range of 1⅝ to ¾ of a single turn. If the flow of steam to the heating apparatus is properly controlled and limited to the real demands for heat, there will be no steam discharged through the outlet, even when the trap valve is entirely removed.

He does not agree that the hot water systems make a larger demand upon the locomotive than direct systems. More heat is put into a direct steam-heated car, as the paper states, these cars are overheated, and therefore more heat is taken from the locomotive. The demand upon the locomotive is therefore greater for steam-heated cars than for cars heated by hot water. He further disagrees with the statement that the locomotive is not able to supply the slightly increased pressure in the train pipe required by hot water heating systems, and differs absolutely with the statement that the steam pressure necessary to operate the heating apparatus determines the draft which that heating apparatus makes upon the locomotive. The train pipe pressure does not measure the demands of the heating apparatus upon the locomotive boiler; the only measure of the demand is the weight of the water of condensation obtained from the heating apparatus in a given length of time. In other words, the demand upon the locomotive boiler is measured by the amount of water which must be evaporated in the boiler in a given time to replace the amount drawn from the boiler to supply the steam-heating apparatus. It is true that with the water-heating system there may be a demand for five or ten pounds of steam pressure at the rear car in train, but the higher pressure in the train pipe, if the pipe is free from leaks, does not make an increased demand upon the locomotive boiler. It is the flow of steam, and not the pressure of steam, which creates a demand upon the locomotive, and which is the true measure of the draft which the heating apparatus makes upon the boiler.

The suggestions in this paper as to train pipe arrangements would call for 84 different places of leakage under a 14 car train in the train pipe alone. The best arrangement provides for the heating of the whole train pipe, and 70 of these places of leakage can be dispensed with, leaving only the gaskets between the cars as the points where it is possible for leakage to take place.

There are a number of points of interest which might be mentioned in connection with the Baker heater, the use of salt and fresh water, the even distribution of heat and the heat storage offered by hot water. For instance, if a pipe is filled with water at a temperature of 212 deg. Fahr. and another with steam at the same temperature, and both cooled to a temperature of 60 deg. Fahr., 235 times as much heat is given up by the hot water as by the steam and the water to which it is condensed. When the Baker heater piping is filled with salt water, all renewals made necessary by the evaporation of the water should be made with fresh water.

Mr. A. M. Waitt (L. S. & M. S.): We have been using two styles of valves for admitting steam to the radiating pipes and by means of either we are able to secure a fine graduation, nearly to the degree of admitting an amount of steam that would pass through a hole $\frac{1}{100}$ in. in diameter. I am experimenting now with some automatic traps for taking care of the condensation and find that one or two traps so far brought out give good results.

Mr. Thurtell: There has been nothing said in regard to removing the atmospheric pressure from the pipes; if the pressure is removed there will soon be a rapid circulation of steam, but if steam is turned into the pipes before the air pressure is removed, there will be a slow circulation.

Mr. J. N. Barr (C., M. & St. P.): We make no provision in the train-pipe for allowing the air to escape. I would like to know what becomes of the air in the pipes of 14-car trains when the steam is turned into the pipes? I believe if the air could be removed entirely, the cars would soon become so hot that they would be unbearable. I am very decidedly of the opinion that it is the presence in the pipes of a very large quantity of air that prevents getting an excessive temperature in cars heated by direct steam. From experiments which we have made in heating the shops with exhaust steam, it seems to me that a little automatic air valve that would let the air out of the pipe would be very efficient, and would ob-

viate the necessity of using a pressure of 50 or 60 lbs., which is claimed to be necessary to force the steam to the rear end of the train. I am satisfied that a 14-car train does not have a greater complication of pipes, or any more extended piping than we have in our shop, and yet 2 lbs. pressure will force the steam to the most remote corner.

Mr. MCELROY: In heating trains with steam the air in the pipes is absolutely necessary for proper regulation of temperature. The steam follows the piping for a distance depending upon the amount of steam going in and it will stop following the pipe when sufficient cold piping is presented to condense the steam as fast as it enters. The rest of the piping is filled with air and without the air it would be impossible to regulate properly. The lack of air in the heating pipes of the return system is, in my judgment, the greatest difficulty met with in regulating the temperature of cars with that system. There should be means provided for admitting air when the steam pressure is reduced or shut off.

An Answer to Mr Prouty.

In the *Mail and Express* (New York) of Dec. 15 Mr. J. H. Leonard, answering Interstate Commerce Commissioner Prouty's argument in the *Forum* (reported in the *Railroad Gazette* Dec. 17), says:

He asserts of a conjectural Chicago-Kansas City pool that one party thereto finding the income therefrom not what it deems itself "entitled" to, confers with its associates, who thereupon agree that the rates are too low and advance them. No such fact ever transpired, and the conception that five roads would thus increase rates to protect the deficit company is grotesque.

He says the rail lines between Chicago and Kansas City have no "water competition to complicate the situation," whereas the Missouri River restricts rates between Kansas City and St. Louis, and St. Louis rates measure Chicago rates, as if that river ran to Chicago. He says "it is reasonably certain that a line having its terminus in Galveston would pool with another having its terminus in Boston"; that one line to Galveston will pool with one other to Boston is impracticable and without precedent. It is certain that 10 or more rail routes from Kansas City to Boston, having also various lake and ocean connections, would not pool with three all-rail routes to Galveston. It would be as exact to assert that the railways from Omaha to San Francisco would pool with those to New York. He declares that a "combination of railroads controls the traffic between Chicago and Kansas City more absolutely than any other trust could control any other thing of common necessity," yet no such combination or trust exists. He himself cites competing routes from Kansas City to Galveston, and ignores the potential fact that St. Louis, Memphis and New Orleans also compete therefrom against Chicago and its lines, which cannot, therefore, "control the traffic."

So much to illustrate Mr. Prouty's inaccuracies, but it is the regretable tone of Mr. Prouty's article which most deserves attention. A National Commissioner holding his railway and public relations should not only be correct, but fair. He calls "a transportation trust the most dangerous of all trusts, because it absolutely dominates the situation." He cites no instance of such domination or how it could prevail, except in the sense that all merchants who sell flour dominate the flour situation. He says that if pools were authorized there would "be nothing to restrain these lines from an arbitrary advance in rates," disregarding the competitions of rivers, lakes, oceans, canals, contesting ports, nations and markets, statutory and common law, and that not five per cent. of the national tonnage was ever pooled. . . . He does not discuss the pertinent question whether the results he imagines ever transpired under previous pools. Mr. Blanchard has shown they did not; that rates decreased; that not five per cent. of the tonnage of the country was pooled and that 90 per cent. of its railways never pooled.

Mr. Prouty's ultimate logic is that as the railways exercise too much power, his Commission should possess yet more, and that all the rights of the carriers to make interstate rates for the use of their properties should be subordinated to the judgment of five Commissioners representing adverse political parties by law, as well as contesting territories, and further that they shall also be given substantially the powers of a court to enforce their opinions.

. . . A commission constituted as impartially as the English Board certainly ought to be acceptable here, provided American roads could have similar rates for similar service; but if our railways make rates too high, it is clear that a commission without practical knowledge and holding Mr. Prouty's views would make them too low; and what "impartial tribunal" but the courts could decide between them?

If we were to put all interstate rates under the domination of these gentlemen their task would equal the combined duties of all the other railway commissions in the world. It would be a labor to which thousands of the best railway minds of all countries are devoted daily in the endeavor not to extort or oppress but to develop and justly regulate traffic. In this country over one million freight and passenger rates, between over one hundred thousand stations, would be involved, and their action would apply not only to pooled traffic but the vastly larger unpooled tonnage. Their interstate decisions would also directly affect State traffic by commercial or statutory laws, or through the like demands of their local railway commissions.

The findings of the national body would thus affect the vast majority of all the tariffs of the country. The Commission might, by one majority, then make rates from Kansas, Missouri, etc., to Gulf ports so low or disproportionate as to shrink or destroy the commerce of the Atlantic cities, or vice versa.

They could make and unmake States, localities, corporations and individuals by a majority necessarily political and territorial, and impair or ruin vast vested interests. It would be a control possessed by no other American governmental commission ever constituted as to commerce, the army, the navy, the currency or postal or import tariffs. No foreign governmental boards or officers possess the authority thus asked. Would our manufacturers assent to a proposal to make all changes in import duties contingent upon the approvals, decisions and changes of a commission of five like appointees? Yet our customs dues are but about one-sixth the railway earnings.

It is not surprising, therefore, that the railways prefer not to pool, say, one-tenth of their business rather than assent to the relatively inexperienced, and, judging by this article, probably antagonistic exercise of such enormous powers on all their interstate traffic.

The railway proposal is understood to be simply that to secure uniform, stable and presumably reasonable rates, made after all competitions are considered and thereafter duly published and attached to the contracts sought to be legalized, such rates shall be then put in effect and be fairly tested before the commission declares them unjust. If that body, then, has reason to conclude that such rates are onerous, and that they can only be maintained by such contracts they shall cite the railways to answer. If the evidence sustains the contentions of the commission it should possess power to bring suits touching such rates or order the discontinuance of such contracts, but such findings and orders are not to debar the jurisdictions of the courts nor take effect until their decisions are rendered.

This proposition seems to conform to legal procedure in other causes for debt, wrongdoing or injustice, and Mr. Prouty shows no reason why it is not more just than his proposal or why the railroads should alone be dispossessed of the initial and appeal rights before the courts, or that only the carriers should be convicted of wrong before they are adjudged guilty by five commissioners, who might thus become counsel, jury and judges.

From the Iowa Railroad Commissioners' Report.

The Railroad Commissioners of Iowa filed their annual report with Governor Drake on Dec. 7, and gave special prominence to the case of Barris, *et al., vs.* the Chicago, Burlington & Quincy, which was decided by the State Supreme Court during the winter term. Barris sued to recover excessive freight charges. The defense set up was that the rates were the maximum fixed by Railroad Commissioners. The Court held that this was no defense, and that if the rates were excessive in fact and unreasonable, the company must not charge them, even if the Commissioners' schedule did name them as maximums, hence the Court held that the railroad company must pay the damages and refund the excess.

The Commission declares that this defeats the whole aim and purpose of the Iowa railroad laws, for the Commissioners' schedule will be of no value whatever. Says the report: The act provides that the Commissioners shall make a schedule of reasonable maximum rates, which shall be *prima facie* evidence that the rates therein fixed are reasonable. It was generally believed, prior to this action, that where a schedule of maximum rates was fixed and established by the Board of Railroad Commissioners of the State, after a hearing, and where no appeal was taken from the finding of the Board, that such rates became, under the law, the fixed and established reasonable maximum rates; but this decision holds otherwise, and gives the right to the railroad companies to wholly disregard the reasonable maximum rates fixed by the Commissioners, and permits and allows the reasonableness of such rates to be determined by the Court, regardless of the action of the Board. If a shipper in one county submits the question to a jury, and the Court and the jury fix the rate, say, at 24 cents per 100 lbs. for 100 miles, and a shipper living in a different locality is obliged to submit the same question to a different jury, and that jury finds that a reasonable rate is less, how can it be said that under such conditions a uniformity in rates can be legally established? This decision absolutely destroys the statute of this State relating to the long and short haul.

A Practical Library for a Practical Man.

NEW YORK, Dec. 1.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A library of books on practical subjects is far from being a complete exhibit of practical knowledge. Books have four defects:

1. They are necessarily several years behind the times.
2. Written to develop a topic, they cannot give detail cases of practical work.
3. They are generally too bulky for many of them to be carried about.
4. Such specific cases as may be illustrated or explained in the book cannot be grouped together with other illustrations from other sources and be put into one bundle with the latter for temporary purposes, or in permanent classification.

Periodicals on practical subjects are up to date and deal in detail with specific cases, which have more value to the practical man than the theories and generalities of the book are apt to have. Yet these periodicals are too bulky for pocket use and the various things illustrated are not separated. A complete file of any periodical, with the assistance of the index that is to follow by and by, may give the searcher after facts full information, but not quite up to date, as the index cannot be made up for each issue and the articles relating to any one subject are not grouped and in shape to carry about from place to place.

A very complete, compact and "up-to date" library can be made by any one who will take a number of such periodicals, and properly separate and arrange the contents. Take for example the *Railroad Gazette*. As each week's issue comes to hand, separate the leaves. Fold to a sixth the size of the page, and so as to have the blank margin at the top of the folded page. On this margin write the name of the article which is to be preserved, and place it in the bundle devoted to that topic. Give each bundle a letter designation, or a double letter. Give each article in a bundle a number, and mark the article with its appropriate letter and bundle. Take a specific case to illustrate, namely, the various yard systems which have been described in the issues of the *Railroad Gazette* the last few years. If these could be grouped for comparative study, the engineer would find them of very great value when planning a yard of any magnitude.

In taking out such pages several will be taken out together, owing to more than one topic of value being on one page. In such case write the heading of each topic on the marginal heading and place the whole in one bundle. In the bundles for the other topics enter a blank sheet directing to the bundle in which the missing topic is filed, and its number in that bundle. Back up this blank sheet and give it a number as if it were the article itself.

Some engineers may have memories sufficiently retentive to remember what is valuable in the articles they may read from time to time, but even for such men a collection of articles such as is described may often have very great value in enabling them to show to officials or others the actual practice in such cases. The writer has had numerous such instances in his engineering experience. One case will serve as an illustration. When he was Chief Engineer of a Western railroad the placing of guard rails on bridges was attacked by a hostile person, who gained the ear of the First Vice-President. This person had had experience only in a limited view, and knew nothing of guard rail practice generally. The writer had for some years collated what had appeared on that subject, even when only mentioned incidentally in a line or two of some article in the *Railroad Gazette* or other magazine. The theory of the guard rail location and arguments for the existing location were briefly presented to the Vice-President, and the practice on a very large number of Eastern as well as Western roads was shown by the illustrations collected from technical papers. The fact was at once shown that the writer had very fully informed himself as to the best existing practice, and that his opponent had but limited experience or knowledge. The results were of a value more than equaling many years of subscription to many magazines. That Vice-President would not have looked through a large number of bulky books to examine precedents, but he was more than ready to look through a small, compact bundle of magazine pages.

Such an incident may be a turning point in an engineer's career. But he must have his information in compact shape and ready for instant use, like a rapid firing gun. Moreover, he must not rely solely upon what he carries in his own mind and knowledge, but must be able to show in black and white to others the facts and general good practice which fortify his own conclusions and practice.

CIVIL ENGINEER.

Foreign Railroad Notes.

New postal cars in Austria are lighted by Böse's electrical accumulator system, which is said to illuminate them brilliantly.

In Austria a locomotive engineer, who was tried for causing an accident by negligence, plead in mitigation that he had been 17 hours on duty without food or sleep. He was acquitted.

The report of railroad accidents in Germany for September last gives 218 accidents in operation, of which 31 were derailments and 24 collisions. The number killed was 50; injured, 135. No passenger was killed; 8 were injured; but 31 employees were killed and 104 injured.

In consequence of an investigation of the eyes of the employees of the Prussian State Railroads, a number of them were ordered always to wear spectacles while on duty and to carry a spare pair with them in case of accident. The immediate superiors of these employees are required to keep a list of them, to see that they always wear their glasses when on duty, and to report those who fail to do so.

In March, 1896, the Prussian Minister of Public Works contracted with an agent of all the rail mills of the country to supply all the rails required for the State Railroads and the Alsace-Lorraine roads (belonging to the empire) until the end of March, 1899, at the rate of $26.16 per ton of 2,204 lbs. = $26.59 per ton of 2,240 lbs. At present such rails cost $28.80 per kilometric ton at the German mills.

Rossini is said to have told a Spaniard that he always felt grateful to Spain, and when asked for what reason, answered: "Because if it were not for Spain Italy would be the most backward country in Europe." Somewhat in the same way it seems that we may lose our pre-eminence in train robberies. An engineer of the Siberian Railroad, according to a Swiss newspaper, reports that his division of the railroad runs through a wilderness which is fairly alive with tramps and escaped convicts. They attack cars standing at stations and trains on the road where they slow up on steep grades. Repeatedly these vagabonds, when attacking the trains, have wounded trainmen with the axes which they carry, and the management has been compelled to arm the trainmen with revolvers and ask to have the police force along the line strengthened. Not long ago a band of 10 armed men attacked a train and was driven off by the trainmen. Evidently Siberia will not be able to compete with this country in this matter until its train robbers are provided with better arms than axes.

The Prussian Minister of Public Works directs that hereafter on the State Railroads a mixture of one part acetylene gas and one part oil (enriched) gas be used generally, as it has been shown that this mixture is entirely reliable and no more dangerous than the pure enriched gas. Heretofore, a mixture of one part acetylene and three parts enriched gas has been used. The new composition gives about three times as much light for a

given consumption. No change whatever is required in the gas burners.

The French Northern Railroad has asked the Minister of Public Works for authority to make a rate on sugar exported materially lower than that on sugar for domestic consumption. It offers to carry shipments of 22 tons from St. Quentin to Dunkirk for $25 80 if exported, against the regular rate of $35.30. This is to give a foreign market for the surplus of beet sugar produced on its lines, which has to meet the competition of beet sugar from other countries (chiefly Germany) which pay an export bounty.

The recent fall of the Austrian Cabinet carried with it the resignation of the Minister of Railroads, Chevalier von Guttenberg, the first to occupy that portfolio. In the new Cabinet the Minister of Railroads is Chevalier Heinrich von Wittek, who was the chief of the office under the late Minister and has been since 1868 an official of the Ministry of Commerce in departments connected with railroad affairs, and often represented in it negotiations, etc. He has also written much on railroad questions, and is regarded in Austria as an expert in thi s field.

A new railroad which will cross the border between Austria and Italy was opened recently with religious ceremonies; a bishop, surrounded by priests carrying lighted tapers, consecrated the railroad, which he called a new instrument granted by God for removing evil and spreading good, which, like the art of printing "offers a new battlefield for good against evil, truth against falsehood, faith against atheism." In those parts of the world where the railroad has been doing its gracious work for 50 or 60 years we find, however, that the devil is not quite dead yet.

It seems strange that it should fall to the lot of a Cabinet Minister to fix the price of a cup of coffee, but the Prussian Minister of Public Woaks has recently given orders to the railroad directors under him to require those holding restaurant and buffet privileges at stations to furnish in the third and fourth-class waiting-rooms, besides the higher-priced coffee, a cheaper coffee, of which a large cup with milk and sugar shall be sold for not more than 15 pfennige (3.6 cents), and without milk and sugar for 10 pfennige (2.4 cents). The inspectors are instructed to see that this cheaper coffee is always of good quality and in sufficient quantity, especially when early morning trains are due.

The Prussian Minister of Public Works has issued a circular on care for employees, while resting, at such times as they cannot be at home. Effort should be made, he says, to provide proper shelter, and an opportunity for warming their meals and making coffee, etc. Such provision should be, and presumably is, made in the baggage car for trainmen, but it is still more important to have it at stations and places where the men work, where trackmen and train and stationmen may be compelled to wait long without occupation and to take their meals. Experience shows that at such times the men are especially liable to indulge in intoxicating drinks. This temptation should be lessened by giving the men a clean and comfortable place to stay, stoves, etc., for warming the meals they bring with them and for making coffee. At the regular places provided by the railroads for men to stay over night, hot water should be ready as soon as they come in for making coffee without delay. When this is done, the railroad authorities can take severe steps against those who drink to excess. Further, a sharp watch should be kept on the station buffets, and the keepers of them who furnish the drink, as well as the offending employees, should be complained of. Especially it should be insisted upon that they do not sell the men who drink on credit. Places of entertainment near stations, which often depend largely on the custom of the employees, and attract them by selling on credit, should be observed. In case they offend against the regulations, the police authorities should be asked to withdraw their licenses.

TECHNICAL.

Manufacturing and Business.

The American Pegamoid Co. has been incorporated under the laws of the state of New Jersey with a capital stock of $5,000,000, of which $100,000 has been paid in, for the purpose of importing, dealing in and making waterproof materials. The incorporators are: John R. Bartlett, Conrad N. Jordan, John T. Collins, John J. McCook, Gilbert I. Herbert, John A. McCall, Joseph J. Byers and Thomas A. McIntyre, of New York; Edward H. Harkell, of Newton, Mass.; Peter T. Austin, of Brooklyn; Arthur Wallace Pope and Albert A. Pope, of Boston, and Edward F. C. Young, of Jersey City. The principal office will be at Undercliff, N. J. The New York office is at 11 Broadway.

The plants of the United States Car Co. at Decatur and Anniston, Ala., have been ordered sold under foreclosure at an upset price of $40,000. The sale is ordered in connection with the plan or reorganization, recently referred to in this column.

The Port Byron Car Truck Co., of Port Byron, N. Y., has been incorporated under the laws of New York state, with a capital stock of $200,000, for the purpose of making and selling a patent six-wheel radial street car truck, the invention of John P. Faye, of Binghamton, N. Y. The Directors are: Henry Fenn, Benjamin Lathrop, T. F. Dixon, William Blake, and L. H. King. John W. Barrus is President; E. M. Slayton, Vice-President; Secretary, W. F. Gallt, and Treasurer, Richard Warren

W. H. Stearns and A. F. Klink have been appointed to represent the New York Rail Insulation & Equipment Co., of Newark, N. J., in Chicago, with offices in the Western Union Building. The company has recently received orders from the New York Central & Hudson River; New York, Chicago & St. Louis; Lake Shore & Michigan Southern; Buffalo Terminal; Lehigh Valley, and Chicago, Rock Island & Pacific railroads.

The Composite Brake Shoe Co., 620 Atlantic avenue, Boston, Mass., has arranged with the Sessions Foundry Co., of Bristol, Conn., for the manufacture and sale of its brakeshoes. Hereafter cork inserts will be used altogether for both steam and street railroad service. The works of the Sessions Foundry Co are on the line of the New England Railroad, and as the reader probably knows, have been recently much enlarged and improved. The main foundry room is 530 × 110 ft.

Harrington, Robertson & Co., dealers in rails and track materials for steam and electric railroads, will, on Jan. 1, remove their offices from 125 Milk street to 272-276 Franklin street, Boston, Mass. This change has been made necessary on account of increasing business. The company has added to its force an engineering department and is now prepared to give estimates and also design and furnish steel construction for buildings, roofs and bridges, and also do general engineering for steam and street roads.

James T. Chalfant has resigned as General Agent of the Pittsburgh Locomotive Works, to take effect Jan. 1. Mr. Chalfant has been connected with the works for a number of years.

The Laconia Car Co. has decided to increase its capital stock from $200,000 to $300,000.

W. J. Corrington has been made Manager of the St. Louis branch of the Davis & Egan Machine Tool Co He was formerly connected with the main office at Cincinnati.

The Jackson & Woodin Manufacturing Co. Berwick, Pa., is extending its foundry building. The construction of the new part will be similar to that of the present building, having steel trusses supporting the roof and carrying the trolleys for supporting material over the foundry floor. The contract for furnishing and erecting the steel work has been given to the Berlin Iron Bridge Co.

The Williams & Moore Mfg. Co., of Chicago, lately assigned, has sold out its entire interests to the Q & C Co., Western Union Building, Chicago. The rail jack known as the Williams & Moore and the Williams drill will hereafter be made by the Q & C Co.

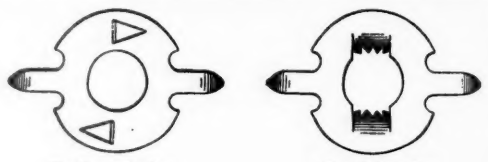
The Pennsylvania Car Wheel Co., recently organized, has elected the following officers: President, Joshua W. Rhodes; Vice-President, William L. Elkins; Secretary and Treasurer, Charles V. Slocum, and Superintendent, A. W. Slocum. The capital stock is $100,000. The wheels will be made at Pittsburgh.

Iron and Steel.

The Lackawanna Iron & Steel Co. of Scranton, Pa., has leased the Bird Coleman and North Cornwall iron furnaces at Cornwall, Pa., and it is expected that they will be blown in next month. The former furnaces went out of blast in July, 1893, and the North Cornwall furnaces have been idle since 1886.

Warren's Nut Lock.

The Warren Lock Washer Company, of Boston, make a self-locking track washer which has endured six years of successful use in the Boston & Maine track, and is now having considerable sale to other railroad companies. The engraving shows quite clearly that the tightening of the nut on this washer will drive the inner serrated tongues into the thread of the bolt and make a



Bridge Washer. *Track Washer.*

firm grip on it, after which the outside tongues, turned up against the faces of the nut, prevent any possible loosening.

The same company makes a special washer for bridge and car work (soft wood only), which is equally simple and inexpensive. It locks to the nut in the same way as does the track washer, while the points, stamped out of the metal and bent at a right angle to the washer, are driven into the wood immovably. The company refers to many users for endorsements as to the efficiency of this nut lock.

The Boyden-Westinghouse Suit.

The case of the Boyden Power Brake Co. vs. The Westinghouse Air-Brake Co. has been restored to the docket of the Supreme Court for re-argument and has been assigned to the first Monday in March. This will make the third hearing in the case.

Pig Iron Production in November.

According to the figures of the *Iron Age* we have entered the current month with the highest rate of pig iron production yet reached in this country. On Dec. 1 there were 191 furnaces in blast, with a weekly capacity of 226,024 gross tons, against 183 furnaces in blast Nov. 1, with a weekly capacity of 213,159 gross tons, and against 147 furnaces in blast Dec. 1, 1896, with a weekly capacity of 142,278 gross tons. The highest rate of production reached previous to last month was on Nov. 1, 1895, when there were 239 furnaces in blast with a weekly capacity of 217,306 gross tons. There is some reserve capacity still in certain districts, but preparations for resumption are being made only in isolated cases, and this accession is likely to be fully balanced by the usual blowing out of plants for repairs. It will take very considerable inducement in the way of better prices, to draw out further capacity, and that inducement is not being held out by the recent course of prices, or by the outlook for the next quarter, which is not particularly brilliant, whatever the spring may bring. On Dec. 1 the stocks on hand, sold and unsold, were 723,885 gross tons, against 753,537 gross tons on Nov. 1.

THE SCRAP HEAP.

The Chicago & Northwestern has adopted schedules of tonnage rates for its several classes of engines, to be used in making up freight trains throughout its lines.

Congressman Gillett, of Massachusetts, has introduced in the House of Representatives an employers' liabilities bill (modeled after the law now in force in Massachusetts), which sets aside the common law rule exempting an employer from liability for personal injuries sustained by an employee in consequence of the negligence of a fellow-servant. Mr. Gillett's bill, as drawn, applies to employment in the District of Columbia and the Territories, and to carriers engaged in interstate commerce.

"South Dakota Commissioners Busted" is the heading of an item in a Western paper relating to facts heretofore reported concerning the inability of the Railroad Commissioners of the state named to prosecute their case in the United States courts against the railroads which have refused to reduce rates in accordance with the tariff made a few months ago by the Commissioners. The railroads evince a disposition to contest the power of the Commissioners very strenuously, and testimony will have to be taken in Chicago; moreover, the Commissioners will need some high-priced witnesses. But the Legislature allowed the Commissioners only $5,000 for their expenses for two years and half of the money is already gone. North Dakota is in almost precisely the same situation. It has been stated in Bismarck papers that the Governor has advanced the money necessary to carry out the purpose of the Commission but whether this means the vigorous prosecution of the suit we are unable to discover.

The published statement that the William Cramp & Sons Ship & Engine Building Co. will establish a large ship yard at Seattle, Wash., is denied by Mr Charles H. Cramp, who says that the company has no intention of engaging in ship building at any place other than at its yards in Philadelphia.

Opening of the New Austro-Hungarian Line.

The *Neue Freie Presse* of Oct. 17 contains the following: "With the opening of the new railroad between Cervignano and San Giorgio di Nogaro a long-felt want has been filled. The new line of traffic, which has been for some time under construction, lessens the distance between the two most important ports on the Adriatic Sea, Trieste and Venice, by some 6.7 km. (4 2 miles) and offers inducements to development undreamed of by the inhabitants of the so-called Traumland (dreamland) traversed by the route. Only the comparatively short distance of 11 km. (6.8 miles) separates Cervignano from the Italian boundary, but it is only recently that the Austrian and Italian authorities have come to realize the importance of this connection. What time will intervene before the new line may be called one of the great veins of traffic between Trieste and Veniee is still a matter of conjecture."

Railroading in China.

The first report to the State Department from Consul-General Goodnow, at Shanghai, contains a warning to American railroad men not to go to China for employment. He says that there is at present no market for their labor in China, and should more roads be constructed there will be a market only if these roads are built by Americans. There are only two railroads in operation, with a total mileage of 293¾. They employ only 27 foreigners. The highest salaried natives are the telegraph operators, at $40 per month. Engineers get $20 to $30, and train hands and trackmen $6 to $10 per month. All of this is in Mexican silver, worth 44 cents in gold on the dollar. Another road is under construction from Shanghai to Woosung, 14 miles, and Chinese are doing all the work. The first sod was recently turned for the projected road from the Hankow to Pekin, the completion of which depends upon the success of the Belgian syndicate in floating its loan.

Operation of the Delaware & Hudson Canal.

The Delaware & Hudson Canal Company has notified the boatmen on its canal that next year the transportation of coal to Rondout will be conducted on a new plan, a plan which seems to be nothing more nor less than a consolidation of the operations of an army of private boatmen into a single enterprise, after the manner pursued in railroad traffic 65 years ago, when railroad companies first learned that economy required that the trains of a railroad should be all under a single management. The Delaware & Hudson circular states that, with the beginning of the season of 1898, the company will select 450 boats and 200 boatmen, and assign the available traffic to the several individuals impartially. The men will be expected to run in turn, "first in, first out," taking loaded boats at Honesdale and empty boats at Rondout in the order of their arrival. It is expected that each boatman will be able to make from 12 to 15 trips during the season. All boatmen will be expected to furnish their own outfits, with horse and crews, as heretofore, and will enter into a written contract with the company to transport coal by the new method upon terms to be announced later. On or before Jan. 31, 1898, the company will notify such boatmen

as it may desire to retain in service, and if the terms are satisfactory to the boatmen selected, they will be expected to make an assignment of their interests in their boats to the company. All other boatmen will be reimbursed for their rights in their respective boats by purchase of their interests.

A Contingent Appointment.

The State Board of Railroad Commissioners will go to Lindsborg on Jan. 4, provided the members receive their new annual passes in time, to take testimony on the complaint of the officers of that place in regard to excessive freight rates to Salina on the Salina & Southwestern road.—*Topeka (Kan.) Press Despatch.*

American Dynamite in South Africa.

Such an important position does the dynamite trade occupy to-day in that part of Africa south of the Zambesi that peace in the Transvaal, it might be said, depends much on its regulation. It was the almost prohibitive duty on dynamite that incited many of the better class of Americans, who form a majority of the mine managers, engineers and experts at Johannesburg to take part in the Jameson fiasco. A steady growth in our trade may be ascribed to the superior quality of the American product which is attested to by nearly all mining men on the Rand, irrespective of nationality. This is shown from the fact that dynamite can be delivered in the Transvaal from Hamburg, including cost of importation and duty, for $9.39 per case, and from Dr. Nahnsen's factory for $10.87, while the rate from America is $11.22, but the latter country, nevertheless, has the call on the trade. The cost from Cornwall is $12.23 per case.

Immediately on the discovery of gold in the Transvaal, dynamite came into great demand, and a syndicate obtained a concession from the government to manufacture the explosive. This developed into a monopoly, for, when the mine managers rejected the Transvaal article, which was manufactured from ingredients procured in Germany, the duty on the imported article was raised to what was expected would prove a prohibitive rate. Many mines preferred to pay the exorbitant rate and get the American article, but there was enough demand for that manufactured in the Transvaal to cause a great rush, and when the syndicate found they could not put the imported ingredients together fast enough, the manufactured article was imported straight from Germany and entered, of course, free of duty. Members of the Chamber of Commerce in Johannesburg held an indignation meeting on Sept. 8, over the alleged agreement between this syndicate, called Noble's Trust, and American manufacturers not to supply the Transvaal with dynamite, and sent a delegation to President Kruger to urge immediate favorable action in the dynamite matter in order that America might not shut down on the trade.

New Costa Rica Railroad.

The Constitutional Congress of the Republic of Costa Rica has approved the contract, concluded June 14, between the Secretary of Promotion and John H. Casement, of New York, for building the Pacific Railroad referred to in these columns some weeks ago. Mr. Casement binds himself to build, for the sum of $2,898,971, a line of road from San Jose, the Capital of the Republic, to Port Tivires on the Pacific Coast, and to furnish the rolling stock for the new line. The roadbed is to be 4.57 meters wide in cuts and 3.25 meters wide in fills, the gage being 3 ft. 6½ in. The contract calls for building a shop at San Jose with the necessary machinery for repairing the rolling stock, and an auxiliary station at Port Tivires. Also a locomotive roundhouse at the Capital, with a capacity for four engines.

The equipment is to consist of four passenger and freight locomotives of 40 tons each, two of 28 tons each, six first-class passenger cars, six second class passenger cars, 20 freight and baggage cars, and 40 platform cars, all of the American type. Building is to begin within six months after the final approval of the contract, and the road must be completed within 30 months from the time of beginning the work.

A Railroad for Equador.

The government of Equador has entered into a contract with Archer Harman, of New York, representing a syndicate composed of United States capitalists, for building a railroad from Guayaquil to Quito. The total cost is estimated at $17,532,000. The road is to run from Quito through Santa Rosa, Taabillo, San Miguel, Ambato and Guamote, in all 650 km. (404 miles).

The concession grants to the company the extending railroad from Guayaquil to the interior, 65 miles. The entire road must be finished within six years from the time of beginning the work, which must be within the present year. The greatest altitude to be reached is 12,300 ft. It will be necessary to build 830 bridges, some of them as much as 500 ft. span.

An Aerial Railroad in Colombia.

A contract has been made between the Republic of Colombia and Nicolas Krohne, of Germany, for building an aerial railroad from the city of Honda, on the Magdalena River, to Agualarga, a town on the savannah of Bogota. The railroad is to be completed within three years from the date of the approval of the contract, the Otto Aerial system being used. Work must begin within 18 months, and the company is authorized to build a branch line into producing centers.

The rates of transportation are to be fixed by the company, but must not exceed 150 marks per ton from the Magdalena River to the savannah of Bogota. The company binds itself to reduce the tariff each five years until it shall be but 75 marks per ton. The government mails are to be transported free of cost, but upon other government property there will be the usual tariff rates. At the expiration of 50 years the entire property reverts to the government.

Electricity on the Delaware, Lackawanna & Western.

The statement has been made several times recently in the daily newspapers that the Delaware, Lackawanna & Western Railroad Company is about to equip certain of its important suburban lines for electric traction, using the third rail. We feel entirely warranted in saying that there is no immediate prospect of this being done and that in fact, while such a change is always possible, it is certainly remote in this case.

Railroad Along the Left Bank of the Seine.

The Orleans Railroad intends to extend its tracks from the present terminus on the Quai d'Austerlitz along the left bank of the Seine to the Quai d'Orsay and the Place des Invalides. The proposed plan involves an open cut for about 2,030 ft. from the present Orleans station and then an uninterrupted tunnel for 7,800 ft to the Cour des Comptes. In an article in *La Revue Technique*, M. G. Mercier gives an account of an alternative plan by M. Paul Villain, which offers æsthetic and practical advantages, and which is shown in a series of cross sections at the more important and characteristic points on the line. M. Villain proposes to build the road along the Quais on the left bank, partly under the roadway and partly under the sidewalk. In some places there would be tunnels, in others, galleries open on one side. The line would encroach upon the low wharves along the river only for a short stretch, and even then but very little. M. Mercier hopes that the Orleans company will carefully consider this plan, and adopt the best possible means for extending its road into the heart of Paris.

Electric Traction in France.

La Société des Chemins de fer économiques du Nord, which occupies an important place in the transportation industry in France, is about to close a contract with the Compagnie de traction for equipping the lines of its system for electric traction. The Société des Chemins de fer énonomiques du Nord is the concessionary in the departments of the Nord, Pas-de-Calais, Isère and Haute-Savoie of a system of more than 330 miles, of which about 250 are in actual operation. The lines of the department of the Nord, which have been in operation since 1882, show receipts from 1893 down as follows:

	Francs.
1893	643,579
1894	685,547
1895	687,061
1896	724,128

The local line from Lens to Frévent, which was first in complete operation in November, 1895, had an income in 1896 of 154,528 fr., or about 4,600 fr. per mile. The figures for the department of Isère are:

	Francs.
1893, receipts of	139,344
1894 " "	196.320
1895 " "	246.023
1896 " "	260,108

And those for Haute Savoie:

	Francs.
1893	199,170
1894	206.803
1895	210,653
1896	229,983

These figures show a continual increase of receipts on all parts of the system, and the company has paid dividends of five per cent. on its nominal capital since 1884. That the change will be profitable is indicated by the experience of the powerful Compagnie Générale Française de Tramways, which substituted electric for animal traction on its lines in Havre. In 1893, with animal traction, the number of passengers carried was 5,099,116. In 1894, with animal traction from Jan. 1 to Sept. 24, there were 2,814,998 passengers, and from Sept. 25 to Dec. 31, with electric traction, 3,761,710 passengers, a total for 1894 of 6,576,708 passengers carried. The figures for 1895 and 1896, with electric traction, increased respectively to 8,670,277 and 9,659,754. Another example is furnished by Marseilles, where since the substitution of electricity for steam and animals, the number of passengers carried has risen to 5,171,067 in 1896, as contrasted with 3,712,161 in 1893.

Obstructing the "Loop" in Chicago.

At a meeting of the Chicago City Council Dec. 13 an ordinance was passed which declares that the construction of passageways, bridges, platforms and structures of any kind or nature in connection with the structure of the Union Elevated Loop is a nuisance and contrary to law, and that "no structure of any kind or nature shall be permitted to be built or erected in the future."

LOCOMOTIVE BUILDING.

The Ohio Steel Co. Ltd., Cleveland, O., is in the market for one small engine for use at its works.

The Duluth, Missabe & Northern is in the market for two switching engines.

The Buffalo, St. Mary's & Southwestern Railroad may buy two or three new locomotives before June 1, 1898.

The Pittsburgh Locomotive Works are finishing an order for six locomotives for the Kan Sai railroad of Japan.

The Minneapolis & St. Louis will order five passenger and probably one switching locomotive early in January.

We have reason to believe that the Detroit, Toledo & Milwaukee will shortly be in the market for five freight locomotives.

The Arkansas & Choctaw Railroad has placed an order with the Pittsburgh Locomotive & Car Works for one mogul locomotive.

We understand, but it has not been officially announced, that the Cincinnati Northern will be in the market for three freight locomotives.

The Northern Pacific has placed an order with the Schenectady Locomotive Works, of Schenectady, N. Y., for several freight and passenger engines.

The Bangor & Portland Railroad has placed an order with the Cooke Locomotive Works, of Paterson, N. J., for one 10-wheel engine with 19×26-in. cylinders, for use in heavy freight service.

It is probable, but not official, that the Lake Erie & Western, including the Fort Wayne, Cincinnati & Louisville and Northern Ohio roads, will be in the market for five new freight locomotives.

The Dickson Locomotive Works, of Scranton, Pa., have received an order for two 6-wheel switching engines from the Sanyo railroad of Japan. They will have 12 × 16 in. cylinders, side tanks, steel fireboxes, brass tubes and vacuum brakes.

The Denver & Rio Grande has placed an order with the Baldwin Locomotive Works for the two locomotives referred to in this column Nov. 26. They will be 10-wheel freight locomotives with 20×26-in. cylinders and duplicates of two of the same kind built for the road early this year by the Baldwin Locomotive Works.

The Baltimore & Ohio has placed an order with the Baldwin Locomotive Works for 20 consolidation locomotives, to be duplicates of the 20 built for the road by the Baldwin Locomotive Works in June last. They will have 21 × 26-in. cylinders, 50-in. drivers and weigh 150,000 lbs., with 136,000 lbs. on the drivers. The tender capacity will be 4,000 gals.

The Brooks Locomotive Works, of Dunkirk, N. Y., have received an order from the Wisconsin Central for six 10-wheel freight and four 10-wheel passenger engines. The former will have 20 × 26 in. cylinders, 63 in. (outside diameter) driving wheels and four 33-in. steel tired wheels; engine truck, four-wheeled swiveling and swing center; boiler, improved Belpaire wagon top type, 66 in. in diameter, with 2 in. tubes, No. 12 B. W. G.; firebox, sloping type on top of frame, 113 in. long and 41 in. wide; driving wheel axles, front and back, 8½ × 11 in., main 9 × 11 in., of Lowmoor iron; journal boxes of cast steel with heavy Ajax metal bearings; tank capacity, 4,500 gals. The locomotives will be equipped with M. C. B. couplers on rear of tender and front of engine, magnesia sectional boiler lagging and Westinghouse-American automatic brakes for driver, tender and train service, with 9½ in. pump; the passenger engines will have 19 × 26 in. cylinders; 69-in. driving wheels, and four 33-in. steel wheels. The other specifications are the same as for the freight engines, except that Westinghouse-American automatic engine truck brakes and Westinghouse train signals will be used in addition to the brakes for driver, tender and train service.

CAR BUILDING.

The Minneapolis & St. Louis has received bids on 200 box cars.

It is reported that the Chicago & Northwestern is asking bids on 500 box cars.

The Florida Central & Peninsular is about to place orders for 250 ventilated box cars.

It is reported that the Cincinnati, Hamilton & Dayton will buy 500 or 1,000 more box cars.

The Illinois Car & Equipment Co. is building 50 refrigerator cars for Morris Nelson & Co.

The Baltimore & Ohio has completed arrangements for buying about 5,000 new freight cars.

The Rio Grande Western is considering buying some new chair cars, but bids have not yet been asked.

The Michigan-Peninsular Car Co. is building 250 freight cars for the Detroit, Grand Rapids & Western Railroad.

While it is not official announced, it is probable that the Cincinnati Northern will buy 100 box and 20 flat cars.

The New York, Chicago & St. Louis is reported as having sent out specifications and asked bids on 1,000 cars.

It is reported that the Cripple Creek District Railroad will shortly be in the market for 135 freight cars, probably coal cars.

The Middletown Car Works, of Middletown, Pa., has received an order to build two pickle tank cars for the H. J. Heinz Co.

The Great Northern has placed an order with the Barney & Smith Car Co., of Dayton, O., for 16 tourist and 10 combination cars.

It is reported that the Colorado & Northwestern has placed an order with the Barney & Smith Car Co. for four passenger and combination cars.

While it is not officially announced, we understand that the Detroit, Toledo & Milwaukee will be in the market within a few weeks for 300 box and 50 flat cars.

The Canadian Pacific has placed an order with the Crossen Car Mfg. Co., of Cobourg, Ont., for 20 passenger cars. The road will also build in all about 40 passenger cars at its own shops.

We have reason to believe, but it is not official, that the Lake Erie & Western Railroad including the Fort Wayne, Cincinnati & Louisville and Northern Ohio roads, will buy 500 box cars.

The 50 coal cars ordered by the Kansas & Texas Coal Co. from the St. Charles Car Co., and noted in this column last week, will be built after the M. K. & T. Co.'s specifications and equipped with American steel bolsters.

The Atchison, Topeka & Santa Fe will soon build at its Topeka shops, eight 60-ft. plain baggage cars without end platforms. These cars will have no special features and will not be buffet cars, as stated by a contemporary last week.

It is now reported that the order for 300 ore cars for the Duluth & Iron Range, which was mentioned some weeks ago, will be placed very soon, and that the same road will build 250 cars at its own shops at Two Harbors, Minn.

The Arkansas & Choctaw Railroad has placed an order with the St. Charles Car Co. for 30 new cars, to be standard gage and arranged for use as logging cars. They will be equipped with Trojan couplers and Westing house brakes.

The Atchison, Topeka & Santa Fe will probably buy, or build in its own shops, during the winter and early spring, 250 refrigerator cars and 100 50-ft. furniture cars, but beyond this will not be in the market for any additioual equipment.

The Duluth, Missabe & Northern has placed an order with Pullman's Palace Car Co. for 400 ore cars of 60,000 lbs. capacity. They will be equipped with Barber 70,000 lb. trucks, Chicago couplers, Hinson drawbar attachments, Detroit springs and Westinghouse air brakes.

The Lake Superior & Ishpeming contemplates asking bids on about 100 ore cars in the near future, although the specifications have not yet been made out. These cars will be about the same style as all other ore cars which are used in the Lake Superior iron ore business, and will have a capacity of not less than 30 gross tons.

The Pittsburgh, Bessemer & Lake Erie Railroad has placed an order with the Ohio Falls Car Mfg. Co., of Jeffersonville, Ind., for 100 box cars. 35 ft. long and of 60,000 lbs. capacity, for delivery in February or March. They will be equipped with Tower couplers, Westinghouse air brakes, Chicago roofs, Dunham door fixtures, Bettendorf truck bolsters, Crescent Steel Co.'s springs and Brady journal bearings.

The Omaha, Kansas City & Eastern has placed orders with the Pullman's Palace Car Co. for 300 stock and 200 box cars, all of 60,000 lbs. capacity. The former will be 36 ft. long inside measurement and equipped with Cloud steel trucks, elliptic springs, Tower couplers, Westinghouse air brakes and malleable castings. The box cars will be 34 ft. long and equipped with Chicago roofs, Lawler door hangers, Tower couplers, Westinghouse air-brakes and Cloud trucks.

The Long Island Railroad has placed the order for the 20 combination cars, referred to in our issue of Nov. 19, with Pullman's Palace Car Co., of Chicago. They will be 57 ft. 6 in. long, with 20-ft. compartments, and be furnished with Pantasote curtains, Adams & Westlake curtain fixtures, Pintsch gas, Taylor wheels, Westinghouse air brakes, Standard couplers, Sessions platforms, Marden brakebeams, French and National springs and Long Island standard diamond trucks.

The Consolidated Traction Co., of Jersey City, N. J., contemplates ordering about 50 new open cars.

The Bloomington City electric road, of Bloomington, Ill., will place orders next month for a small number of open and closed cars.

BRIDGE BUILDING.

Akron, O.—The Board of City Commissioners has notified the railroads that they must build a bridge across Perkins street.

Alexandria, La.—The Gulf, Louisiana & Northern Railroad (see *Railroad Gazette*, Dec. 17, page 898), proposes to build a bridge over Red River at Alexandria. Joseph P. Waitz, Atchison, Kan., is president of the road.

Birmingham, Pa.—The State Board of Public Grounds and Buildings will visit the site of the new state bridge over the Little Juniata, at Birmingham, on Dec. 30, and meet the County Commissioners of Blair and Huntingdon Counties. The lowest estimate which the board received for building the bridge was $9,500, while the viewers appointed by the court estimated the probable cost at about $2,800.

Chambersburg, Pa.—A writ of mandamus has been issued on application of the Street Committee of Borough Council upon the County Commissioners requiring them to erect the bridge over Kennedy street ordered by the court some time ago.

Chicago, Ill.—The City Council will be asked to include in the next list of appropriations $100,000 for a bascule bridge at Randolph street for which the Commissioner of Public Works, L. E. McGann, has prepared plans.

Columbus, O.—The Cleveland, Cincinnati, Chicago & St. Louis will build a steel bridge over the Olentangy River at West Columbus.

Easton, Pa.—The Council has passed a resolution empowering the mayor to execute an agreement with the Central Railroad of New Jersey and with the Eastern & Northern or Lehigh Valley Railroad providing for building footbridges across the tracks of the said railroad companies on Peach street.

Fort Wayne, Ind.—The Board of Works will build a suspension bridge across St. Mary's River, from Ossage street to Swinney Park, to cost about $1,800.

Gainesville, Tex.—City Engineer S. J. Brozelton, it is reported, is working on plans for a steel bridge to be built across the Pecon River.

Kinston, N. C.—The Atlantic & North Carolina, it is reported, will build a bridge across the Neusue River.

Lecompton, Kan.—The County Commissioners (Smith County) have been petitioned to build a bridge across the Kansas River at Lecompton.

Marietta, O.—Major Charles F. Powell, Major William H. Bixby, and Captain James G. Warren, of the United States Engineer Corps, appointed by the Secretary of War to pass upon the plans of the Marietta & Williamstown Bridge Company for a highway and trolley line bridge over the Ohio River from this city to Williamstown, W. Va., held a meeting at Marietta recently and heard opinions. Mr. C. A. Jutte, of Pittsburgh, chief promoter of the enterprise, presented the plans, calling for a 600 ft. span.

Merrillton, Wis.—It is reported that the Green Bay & Western Railroad will build a steel bridge, 400 ft. long, over the Black River, at a cost of $24,000.

Newton, Ia.—Bids are called for the building and repair of bridges in Jasper County for the year commencing April 1, 1898. Frank Fish, County Auditor.

Northfield, Mass.—The Franklin County Commissioners have decided that the Northfield bridge across the Connecticut River shall be built at Bennett's Meadow. This bridge will cost $35,000.

Peoria, Ill.—Plans for the new park bridges will be ready in January. Address Board of Park Commissioners.

Philadelphia, Ind.—The Pittsburgh, Cincinnati, Chicago & St. Louis will build a new bridge at Philadelphia, Ind.

Pittsburgh, Pa.—A charter was granted at Harrisburg Dec. 21 to the Highland Bridge Co., of this city, capital, $75,000. The company will construct a bridge over the Allegheny River from the foot of Centre Street, Aspinwall, Pa., to a point in this city near the Brilliant pumping station and about a mile from the nearest bridge. The directors are: Frank K. Patterson, Aspinwall, Pa., President; James Shaner, Jr., M. D. Wayman, Sr., M. D. Wayman, Jr, J. Frank Peffer.

Plattsburg, N. Y.—A new bridge will be built across the Saranac River at Plattsburg. B. G. Haynes, Town Clerk.

Portland, Ore.—It is reported that the Northern Pacific will build a bridge at Vancouver, Wash.

Port Washington (L. I.), N. Y.—The Great Neck and Port Washington extension calls for a steel viaduct 700 ft. long, two short I-beam spans and four steel highway bridges. W. A. Cattell, 26 Court street, Brooklyn, N. Y., is the engineer in charge.

Quebec, Que.—The Quebec Bridge Company will submit plans for a bridge across the St. Lawrence to the chief engineer of the Railway Department at Ottawa.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Alabama & Great Southern, preferred, 3 per cent., payable Dec. 17.

Baltimore & Annapolis Short Line, 3 per cent., payable Jan. 1.

Boston, Revere Beach & Lynn, 1 per cent., payable Jan. 1.

Chicago, Rock Island & Pacific, quarterly, 1 per cent., payable Feb. 1.

Cleveland, Cincinnati, Chicago & St. Louis, preferred, 1 per cent., payable Jan. 20.

New York Central & Hudson River, quarterly, 1 per cent., payable Feb. 1.

New York, New Haven & Hartford, quarterly, 2 per cent., payable Dec. 31.

Providence & Worcester, quarterly, 2½ per cent., payable Dec. 31.

Southern, preferred, 1 per cent., payable Jan. 20.

St. Joseph & Grand Island, semi-annual preferred, 2½ per cent., payable Jan. 15.

Baltimore City Passenger, 5 per cent., payable Jan. 3.

Central (Baltimore), 3 per cent., payable Dec. 20.

Metropolitan Street (New York), 1¼ per cent., payable Jan. 15.

Stockholders' Meetings.

Meetings of the stockholders of railway companies will be held as follows:

Choctaw, Oklahoma & Gulf, annual, Philadelphia, Jan. 10.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Chicago Electrical Association* meets at Room 7137 Monadnock Building, Chicago, on the first and third Fridays of each month, at 8 p. m. J. R. Cravath, Secretary.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Locomotive Foreman's Club* meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The *New England Railroad Club* meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736-1739 Monadnock Block, Chicago.

Western Foundrymen's Association.

The Western Foundrymen's Association held a meeting Wednesday evening, Dec. 15, at the Great Northern Hotel, Chicago. Mr. W. N. Moore read a paper, "A Method for Obtaining Weekly Shop Costs." The paper, "Molding Sand," presented by Mr. D. H. Truesdale at the recent Cincinnati meeting, was discussed.

Western Society of Engineers.

A regular meeting of the Western Society of Engineers was held in the society rooms, Monadnock Block, Chicago, Wednesday evening, December 22. Mr. T. T. Johnson presented a paper on "The Restoration of the Artesian Water Supply at Atlanta, Ga." The annual meeting and banquet of the society will take place Tuesday evening, January 4, 1898, at the Technical Club, Chicago. Members of the society are at liberty to invite their friends.

American Railway Master Mechanics' Association.

The thirty first annual convention of this association will be held at Saratoga, N. Y., commencing Monday, June 20, 1898, which is one day earlier than prescribed by the by-laws. This change was made by the Executive Committee, as the best arrangement possible to bring the time of convention closer to the time of the convention of the Master Car Builders' Association. The hotel arrangements and the Joint Committee are identical with those of the M. C. B. Association as noted in the preceding paragraph.

The Civil Engineers' Club of Cleveland.

The regular meeting was held in Case Library, Dec. 14. A committee of three was appointed by the chair to prepare suitable resolutions upon the death of the late secretary of the Club, Mr. Forrest A. Coburn. Mr. Lehman B. Hoit was elected an active member. Mr. John P. Johnston read a paper on "Boilers." He compared various types of boilers as adapted to different purposes, treated of boiler specifications, of the use and abuse of boilers in practice, and of their possibilities in the future. An animated discussion ensued.

At the next meeting on Dec. 28 inst. a paper will be read by Mr. Richard L. Newman entitled, "Construction of Ships for Service on the Great Lakes."

American Society of Civil Engineers.

The forty-fifth annual meeting will be held at the house of the Society, No. 220 West Fifty-seventh street, New York, on Wednesday and Thursday, Jan. 19 and 20, 1898. The business meeting will be called to order at 10 o'clock on Wednesday morning. The annual reports will be read, officers for the ensuing year elected, and other business transacted.

Messrs. E. E. Olcott, S. L. F. Deyo, W. E. Belknap and A. S. Tuttle have been appointed by the Board of Direction as a Special Committee of Arrangements, and a programme in detail is being prepared.

There will be a reception on either Wednesday or Thursday evening, and it is probable that, in accordance with the usual custom, the second day of the meeting will be devoted to an excursion to some point of interest. Ladies of the families of members will be welcome on the excursion and at the reception.

Engineers' Club of Philadelphia.

The twentieth anniversary of the club was celebrated by a dinner on Friday evening of last week, at the rooms of the Manufacturers' Club, Philadelphia. About 90 members and guests were present. In an introduction to the formal toasts and other brief speeches, President Joseph T. T Richards reminded the members that they held their organization in too light esteem, and then eulogized the engineering profession. Prof. H. W. Spangler, of the University of Pennsylvania, spoke on the subject, "The Engineering Profession." Mr. George S. Webster, Chief of the Survey Bureau, discussed "Municipal Engineering," and Mr. John H. Converse discussed "Mechanical Engineering." Among the other speakers were Messrs. H. M. Chance, E. A. Scott and Wilfred Lewis. The latter gave an interesting account of the club's early struggles and its successful efforts to combine the social features with effectual work.

Master Car Builders' Association.

The Thirty-second Annual Convention of this Association will be held at Saratoga, N. Y., commencing Wednesday, June 15, 1898, which is one day later than prescribed by the By Laws. This change was made by the Executive Committee for the benefit of members wishing to remain for the Master Mechanics' convention, which is to meet on Monday of the following week. Headquarters will be at Congress Hall. A single room for one person, without bath, will be $3 a day; a double room, $4; double room, with bath, $5; double room, two persons, without bath, $3 for each person; double room, two persons, with bath, $4 for each person.

Members of the Association will have preference of rooms until March 1, 1898. Members who first apply will be best served.

The Joint Committee of Arrangements consists of Messrs. S. A. Crone, P. Leeds, R. C. Blackall and J. W. Marden.

National Association of Freight Commissioners.

The first regular meeting of the National Association of Freight Commissioners was held at Washington, D. C., Dec. 17, for the purpose of effecting a permanent organization. The members represent commercial bodies in their respective cities, and are charged with the care of the interests of merchants in their dealings with transportation companies. Another purpose of the organization is said to be the proper presentation of the shippers' side of questions which at any time may be under consideration by Congress.

Those present at the meeting were N. B. Kelly, of the Trades League, of Philadelphia, Chairman; W. P. Trickett, of the Kansas City Traffic Bureau, Secretary; L. A. Boswell, of the Quincy (Ill.) Freight Bureau; George A. Schroeder, of the Milwaukee Freight Bureau; F. W. Maxwell, of the St. Joseph (Mo.) Commercial Club and Jobbers' Transportation Bureau; E. P. Wilson, of the Cincinnati Transportation Bureau; A. J. Vanlandingham, of the St. Louis Traffic Bureau; F. B. Thurber, President of the American Export Association, of New York; George A. Anderson, of the Pittsburgh Chamber of Commerce; J. A. Smith, of the Charleston (S. C.) Freight Bureau; J. A. Farley, of the Dallas (Tex.) Freight Bureau; F. L. Brown, of the Pacific Coast Hardware and Metal Association.

Officers were elected for the ensuing year as follows: President, N. B. Kelly, of Philadelphia; Vice-President, John A. Smith, of Charleston, S. C.; Secretary, W. P. Trickett, Kansas City; Treasurer, W. F. Maxwell, of St. Joseph, Mo.; Executive Committee, A. J. Vanlandingham, of St. Louis; F. B. Thurber of New York; L. B. Boswell, of Quincy, Ill.; J. S. Davant, of Memphis, Tenn., and J. B. Denison, of Galveston, Tex.

Annual meetings will be held the day preceding the opening session of the National Board of Trade.

Resolutions were adopted at Washington urging that additional power be conferred on the Interstate Commerce Commission, requesting all railroads to adopt uniform freight classification prior to Jan. 1, 1899, and indorsing the pending Anti-Scalping bill. Eastern delegates submitted a resolution favoring, and Western delegates a resolution opposing, pooling bills. An agreement being found impossible, the association adopted a resolution referring the resolutions offered back to the members of the association.

Association of Railway Superintendents of Bridges and Buildings.

Mr. Walter A. Berg, the President, announces that the following committees of the Association of Railway Superintendents of Bridges and Buildings have been appointed for the year 1897-98 to report at the Eighth Annual Convention to be held at Richmond, Va., on Oct. 18, 1898:

Pile-rings and method of protecting pileheads in driving.—G. W. Hinman, Louisville & Nashville R. R.; Wm. S. Danes, Wabash R. R.; F. Eilers, Chicago, Burlington & Quincy R. R.; E. F. Reynolds, Chicago & Northwestern R. R.; Wm. Carmichael, Union Pacific R. R.; C. M. Large, Erie & Pittsburgh R. R.

Cost and manner of putting in pipe culverts.—Walter A. Rogers, Chicago, Milwaukee & St. Paul R. R.; Frank W. Tanner, Missouri Pacific R. R.; John H. Markley, Toledo Peoria & Western R. R.; A. H. King, Union Pacific R. R.; B. F. Bond, Jacksonville & St. Louis R. R.; O. H. Andrews, St. Jo. & G. I. & K. C. R. R.

Best floors for shops and roundhouses.—A. W. Merrick, Chicago & Northwestern R. R.; C. S. Thompson, Denver & Rio Grande R. R.; Wm. O. Eggleston, Chicago & Erie R. R.;

M. F. Cahill, Lynchburg, Va.; J. B. Pullen, Baltimore & Ohio Southwestern R. R.; James Gilbert, Missouri, Kansas & Texas R. R.

Roundhouse smokejacks and ventilation.—George W. Andrews, Baltimore & Ohio R. R.; Wm. O. Eggleston, Chicago & Erie R. R.; Aaron S. Markley, Chicago & Eastern Illinois R. R.; R. J. Howell, Wheeling Bridge & Terminal R. R.; J. T. T. Carpenter, Chicago, Rock Island & Pacific R. R.; A. McNab, Chicago & West Michigan R. R.

Cattleguards and wingfences.—C. C. Mallard, Southern Pacific R. R.; C. S. Thompson, Denver & Rio Grande R. R., A. Zimmerman, Union Pacific, Denver & Gulf R. R.; L. H. Wheaton, The Coast Railway of Nova Scotia; O. W. Osborne Northern Pacific R. R.; R. L. Heflin, Baltimore & Ohio R. R.

Prevention of fire in railroad buildings—John D. Isaacs, Southern Pacific R. R.; Wm. A. McGonagle, Duluth & Iron Range R. R.; M. Riney, Chicago & Northwestern R. R.; H. L. Fry, Cape Fear and Yadkin Valley R. R.; J. P. Snow, Boston & Maine R. R.; Wm. B. Yereance, West Shore R. R.

Storage of fuel, oil and other station supplies at way stations.—Arthur Montzheimer, Chicago & Northwestern R. R.; A. Shane, C., C. & St. L. R. R.; G. E. Hanks, Flint & Pere Marquette R. R.; J. E. Johnson, Toledo, St. Louis & Kansas City R. R.; W. Z. Taylor, Chicago, Burlington & Quincy R. R.; E. M. Gilchrist, Hannibal & St. Joseph R. R.

Railroad highway crossing gates.—Joseph H. Cummin, Long Island R. R.; J. B. Sheldon, New York, New Haven & Hartford R. R.; Wm. E. Harwig, Lehigh Valley R. R.; G. W. Smith, Chicago, Milwaukee & St. Paul R.R.; J. E. Featherston, Missouri Pacific R. R.; W. M. Noon, Duluth, South Shore & Atlantic R. R.

What repairs, and how they can be safely made, to metal and wooden spans without the use of falsework.—F. S. Edinger, Southern Pacific R. R.; B. W. Guppy, Boston & Maine R. R.; J. E. Greiner, Baltimore & Ohio R. R.; John D. Isaacs, Southern Pacific R. R; Walter A. Rogers, Chicago, Milwaukee & St. Paul R. R.; H. W. Fletcher, Chicago & Northwestern R. R.

Care of iron bridges after erection, including best method of protecting them from injury by salt water drippings from refrigerator cars.—J. E. Greiner, Baltimore & Ohio R. R.; B. W. Guppy, Boston & Maine R. R.; James McIntyre, Erie R. R.; T. M. Strain, Wabash R. R.; A. J. Kelley, Kansas City Belt R. R.; L. F. Goodale, Hannibal & St. Joseph R. R.

Turntable construction.—Onward Bates, Chicago, Milwaukee & St. Paul R. R.; J. B. Sheldon, New York, New Haven & Hartford R. R.; D. K. Colburn, Southern Pacific R. R.; John Foreman, Philadelphia & Reading R. R.; E. Fisher, Missouri Pacific R. R.; Henry Goldmark, Chicago, Ill.

Committee on applications for membership.—Joseph H. Cummin, Long Island R. R., Long Island City, N. Y.; C. P. Austin, Boston & Maine R. R., Medford, Mass.; C. C. Mallard, Southern Pacific R. R., Algiers, La.; Geo. W. Andrews Baltimore & Ohio R. R., Philadelphia, Pa.

Committee on memoirs.—Walter G. Berg, Lehigh Valley R. R.; James Stannard, Wabash R. R.; Wm. A. McGonagle, Duluth & Iron Range R. R.; B. F. Bond, Jacksonville & St. Louis R. R.

Special committee on Relief.—James Stannard, Wabash R. R., Moberly, Mo.; H. M. Hall, Ohio & Miss. R. R., Olney, Ill.; W. M. Noon, Duluth, South Shore & Atlantic R. R., Marquette, Mich.; C. P. Austin, Boston & Maine R. R., Medford, Mass.; G. W. Hinman, Louisville & Nashville R. R., Evansville, Ind.; Aaron S. Markley, Chicago & Eastern Illinois R R., Danville, Ill.

PERSONAL.

—Mr. N. R. Warwick has resigned as District Passenger Agent of the Missouri Pacific at Cincinnati, O., on account of ill health.

—Mr. F. W. Fratt, heretofore Superintendent of the Texas Midland, with headquarters at Terrell, Tex., has resigned; effective Dec. 20.

—Mr. L. L. Rawls, Commercial Agent of the Central of Georgia, with headquarters in the General Offices at Savannah, Ga., has resigned.

—Mr. H. T. Greene, recently appointed Assistant General Passenger Agent of the Mexican National at the City of Mexico, has resigned.

—Mr. Joseph McEvoy, Traveling Auditor of the St. Joseph & Grand Island, died at St. Joseph's Hospital, St. Joseph, Mo., Dec. 10, from paresis.

—Mr. J. S. Minard, heretofore Master of Transportation of the Louisville, Evansville & St. Louis, with headquarters at Princeton, Ind., has resigned.

—Mr. R. H. Garrett, Assistant General Passenger Agent of the New Orleans & Northeastern, with headquarters at New Orleans, La., has resigned.

—Mr. Sykes Beckham, formerly of Chattanooga, Tenn., and Superintendent of the Panama Railroad, with headquarters at Colon, Columbia, has resigned.

—Mr. T. A. Allen, Chief Train Dispatcher of the Louisville, Evansville & St. Louis, at Princeton, Ind., has resigned.

—Mr. Jewett Wilcox, heretofore Superintendent of the Dining Car, Eating House and Hotel Service of the Illinois Central, died at his home in Chicago, Ill., Dec. 11.

—Col. John S. Kenyon, Clerk of the Senate, has been appointed Secretary of the Board of Railroad Commissioners of New York State. He will occupy his new office Jan. 1.

—Mr. D. W. Colley, heretofore Commercial Agent of the Houston, East & West Texas, with headquarters at Houston, Tex., has resigned, and that office has been abolished.

—Mr. Arthur J. Moore, formerly Passenger and Ticket Agent of the Chicago & Alton at Denver, Colo., committed suicide at Chicago, Ill., Dec. 15. He was 52 years old and suffered from inflammatory rheumatism.

—Mr. R. W. Parsons has resigned as General Passenger Agent of the Ward Line of steamers to accept the office of Assistant to President H. M. Flagler, of the Florida East Coast Railway, with headquarters at St. Augustine, Fla.

—Mr. Henry F. Dowst, Division Superintendent and Station Agent of the Maine Central at Bangor, Me., has resigned, to take effect Jan. 1. Mr. Dowst has been connected with this company for 30 years. No reason is given for the resignation.

—Mr. H. B. Cole, at one time Traveling Freight and Passenger Agent of the Colorado Midland, and now Traveling Freight and Passenger Agent of the St. Louis & San Francisco, with headquarters at Denver, Colo., has resigned, to take effect Jan. 1.

—Mr. James F. Gluck, for many years an attorney for the New York Central & Hudson River, residing in Buffalo, N. Y., died of heart failure in the Murray Hill Hotel, New York, Dec. 15. He recently returned from Italy, where he had gone for his health.

—Mr. Silvanus Miller, a railroad contractor of Guatemala, died in New York Dec. 17 of pneumonia. Mr. Miller was born in Massachusetts 46 years ago. For many years he had worked in Mexico, Central and South America, building short railroads. At the time of his death he had the contract for building a line from Port Barrios to Guatemala City, the capital of Guatemala.

ELECTIONS AND APPOINTMENTS.

Arkansas & Choctaw.—W. H. Carson, heretofore Superintendent, with headquarters at Texarkana, Tex., has been appointed Assistant General Manager, with headquarters at the same place. C. M. Boswell will succeed him as Superintendent.

Baltimore & Philadelphia.—At the annual meeting of the stockholders of this company, held at the offices of the company in Wilmington, Del., Dec. 15, the following Directors were elected: William M. Canby, Henry G. Morse and Henry A. du Pont, of Wilmington, Del.; J. B. Washington, of Pittsburgh, Pa.; Thomas M. King, W. H. Addicks and R. L. Ashhurst, of Philadelphia, Pa., and William T. Dixon and J. Willcox Brown, of Baltimore, Md.

At the meeting of the Directors J. B. Washington was elected Vice-President and William M. Greene General Manager.

Canadian Pacific.—W. S. Nevins, formerly Freight Agent of the Lehigh Valley at Buffalo, N. Y., has been appointed Contracting Freight Agent, with headquarters at Buffalo, N. Y. He will also represent the Minneapolis, St. Paul & Sault Ste. Marie, and the Duluth, South Shore & Atlantic.

Carrabelle, Tallahassee & Georgia.—W. A. Simmons, heretofore First Vice-President, has been elected President and General Counsel, and C. P. Simmons, heretofore Assistant Secretary has been elected Secretary and Treasurer. Headquarters of both officers will be in New York.

Central of Georgia.—H. B. Byrnes has been appointed Commercial Agent at Savannah, Ga., succeeding L. L. Rawles, resigned.

Chesapeake & Ohio.—C. O. Stimson, heretofore Division Freight Agent of the Cleveland, Cincinnati & St. Louis, at Lafayette, Ind., has been appointed Assistant General Freight Agent of the Chesapeake & Ohio, at Cincinnati, O.

Chicago, Peoria & St. Louis.—At the annual meeting of the stockholders, held at Springfield, Ill., Dec. 13, Elenious Smith, of St. Louis, Mo., was elected a Director, succeding Charles E. Jackson, resigned.

Chicago, Rock Island & Pacific.—E. W. Thompson, heretofore Traveling Passenger Agent, has been appointed General Excursion Agent with headquarters in New York. Eben E. McLeod has been appointed Assistant Passenger Agent, with headquarters at Topeka, Kan., succeeding T. J. Anderson, assigned to other duties. A. C. Turpin has been appointed Traveling Passenger Agent, with headquarters at Boston, Mass. Appointments to take effect Jan. 1.

Columbus, Fulton & Northern.—At a meeting of the stockholders, held at Columbus, Miss., Dec. 16, the following Directors and officers were elected: Newman Cayce, President and General Counsel; J. W. Buchanan, Vice-President; J. T. Senter, Secretary; J. M. Walker, David Johnson, L. B. Franklin, W. J. Walker, W. C. Fitzgerald and Thomas J. O'Neill.

Columbus, Sandusky & Hocking.—The office of Supervisor of Bridges and Buildings has been abolished. W. H. Mautz, who held the position, with headquarters at Columbus, O., will become identified with the Shelby Steel Company.

Danville & Mount Morris.—M. F. Lapp, Purchasing Agent and Acting Superintendent, with headquarters at Danville, N. Y., has been appointed Superintendent with headquarters at the same place, succeeding B. P. Humphrey, resigned.

Florida East Coast.—R. W. Parsons, heretofore General Passenger Agent of the Ward Line of steamers, has been appointed Assistant to President H. M. Flagler. His office will be at St. Augustine, Fla.

Georgia & Alabama.—A new office of Commercial Agent has been created at Montgomery, Ala. W. T. Danforth has been appointed to fill this office. He was formerly Commercial Agent of the Central of Georgia.

Grand Rapids & Indiana.—Assistant General Passenger Agent R. E. Casey has been apppointed Trainmaster of the Southern Division, succeeding J. W. Hunter, promoted. Mr. Casey's headquarters will be at Fort Wayne, Ind.

Grand Trunk.—D. O. Wood has been appointed Assistant Foreign Freight Agent at Toronto, Ont., succeeding J. H. Hannah, promoted. (See this column for last week.)

Greenbrier.—At a meeting of the stockholders of this company recently chartered in West Virginia (see this column for Nov. 26) held at Huntington, W. Va., Dec. 17, the following directors were elected: Decatur Axtell, Richmond, Va.; Melville E. Ingalls, Cincinnati, O.; C. E. Patts, Richmond, Va.; H. S. Simms, Huntington, W. Va.; L. F. Sullivan, Richmond, Va.; C. E. Wilford, Richmond, Va.; F. B. Euslaw, Huntington, W. Va. The officers elected are: President, H. S. Simms, Huntington, W. Va.; Vice-President, Decatur Axtell, Richmond, Va.; Secretary, C. E. Wilford, Richmond, Va.; Auditor, L. F. Sullivan, Richmond, Va.; Treasurer, C. E. Potts, Richmond, Va.; Attorney, F. B. Euslaw, Huntington, W. Va.

Gulf, Beaumont & Kansas City.—W. W. Wilson, heretofore Assistant General Manager, with headquarters at Beaumont, Tex., has been elected Treasurer, with office at the same place.

Houston, East & West Texas.—W. L. Coleman has been appointed Chief Clerk of the general passenger department at Houston, Tex., succeeding G. C. Roussel, resigned. W. T. Hancock, heretofore Cashier in the freight office at Houston, Tex., has been appointed Contracting Freight Agent, with headquarters at Houston, Tex. He will be succeeded by James W. White, formerly Bill Clerk.

Illinois Central.—W. D. Murray has been appointed Superintendent of the Dining Car and Hotel Service, with headquarters at Chicago, Ill., suceeeding Jewitt Wilcox, deceased.

Louisville & Nashville.—Judge F. B. Bonifay, heretofore Assistant Land Commissioner, has been appointed General Land Commissioner, succeeding W. D. Chipley, deceased. Judge Bonifay will have his office at Pensacola, Fla.

Louisville, Evansville & St. Louis.—W. P. Larcey, Assistant Master of Transportation, has been appointed Master of Transportation, with headquarters at Princeton, Ind., succeeding J. S. Minard, resigned.

Maine Central.—Alfred A. White, heretofore Chief Train Despatcher at Portland, Me., has been appointed Eastern Division Superintendent, with headquarters at Bangor, Me. Appointment effective Dec. 15.

Manistee & North Eastern.—D. O. Anderson has been appointed Commericial Agent with headquarters at Manistee, Mich., effective Dec. 1.

Mexican Central.—George J. Hartman, heretofore Superintendent of the Chihuahua Division with headquarters at Ciudad, Juarez, has been appointed Assistant Superintendent of the entire system.

Mexican National.—Herman Falkenback, Traveling Freight and Passenger Agent, with headquarters at Chicago, Ill., has been appointed Acting Assistant General Passenger Agent at the City of Mexico, vice H. T. Greene, resigned. Mr. Falkenback was at one time General Passenger and Ticket Agent of the Columbus, Hocking Valley & Toledo, at Pittsburgh, Pa.

Minneapolis, Anoka & Rainy Lake.—At a meeting of the Directors of this newly incorporated company (See these columns for last week), held at Minneapolis, Minn., Dec. 13, the following officers were elected: President, W. D. Washburn; Vice-President, Dr. D. C. Dunham, of Anoka; Secretary and Treasurer, C. C. Crane.

Mississippi River & Bonne Terre.—Official denial is made of the report which appeared in this column two weeks ago, that C. H. Sharman had been appointed General manager to succeed J. Burns, resigned, and that Mr. Cavanaugh had been appointed General Passenger and Freight Agent. Mr. Burns still remains General Manager of the company.

Missouri, Kansas & Texas.—After Jan. 1 this road will be operated from the company's Texas offices, in Dallas, Tex., where Vice-President and General Manager A. A. Allen will move his office, now at St. Louis, Mo. The change is due to an order from the State Rail road Commissioners which made the residence in Texas of an Active Vice-President of the road a necessity.

Missouri Pacific.—A. A. Gallagher, Southern Passenger Agent, with headquarters at Chattanooga, Tenn., has been appointed District Passenger Agent at Cincinnati, O., succeeding N. R. Warwick, resigned. Appointment to take effect Jan. 1.

New Orleans & Northeastern.—W. Storms, heretofore Chief Clerk in the general office at New Orleans, La., has been appointed Assistant General Passenger Agent at the same place.

New York Central & Hudson River.—W. J. Wilgus has been appointed Resident Engineer of the Eastern Division and is now in charge, under the Chief Engineer, of all work and functions of the Chief Engineer's Department upon all proprietary and leased lines of this road east of DeWitt, and also the whole of the lines of the Rome, Watertown & Ogdensburg west of DeWitt, and also is in charge of construction as Engineer of the new Terminal Railway of Buffalo.

Norfolk & Western.—L. B. Parsons, heretofore a Roadmaster on the Great Northern, at Grand Forks, N. Dak., has been appointed to a similar position on the Norfolk & Western, with headquarters at Roanoke, Va.

Northern Pacific.—T. J. De Lamere has been appointed Superintendent of Car Service. The office of Car Accountant has been abolished since Dec. 1.

Pecos Valley.—C. M. Stanbury has been appointed Master Mechanic, with headquarters at Eddy, N. Mex., succeeding G. F. Miller.

Pennsylvania Company.—David P. Beach has been appointed Superintendent of Signals and Telegraph on the Cleveland Division.

Plant System.—L. T. Fowler, formerly Traveling Passenger Agent of the Merchants & Miners' Transportation Company, with headquarters at Pittsburgh, Pa., has been appointed Agent for the Merchants & Miners' Transportation Company, the Central Railroad of Georgia and the Plant System. Under this arrangement his territory has been extended from Pittsburgh to Chicago, St. Louis, Cincinnati and Louisville, and east and north to Erie, Harrisburg and Cumberland.

Southern Pacific.—Fred. S. Decker has been appointed Assistant General Passenger Agent, with headquarters at New Orleans, La. He will be succeeded by M. M. Monroe, the appointment to take effect Jan. 1.

Southwestern Alabama.—The officers of this company referred to in another column, whose new road is to become a part of the Plant System, are as follows: President, S. G. McLendon, Thomasville, Ga.; Secretary, R. B. Smith, 12 West Twenty-third street, New York; Treasurer, J. Moultrie Lee, Savannah, Ga.; Chief Engineer, B. Dunham, Savannah, Ga.

Speedwell Lake.—The officers of this road, referred to in another column, are as follows: President, Richard B. Moriarty, Morristown, N. J.; Treasurer, George W. Stickle, Rockaway, N. J.; Secretary and Consulting Engineer, Frederic V. Pitney, Morristown.

Susquehanna Connecting.—At the annual meeting held at Scranton, Pa., Dec. 14, F. P. Meore, of New York; Charles Du Pont Breck, C. Comegys and C. S. Boland, of Scranton, Pa., were elected as new directors. At a meeting of the directors the following officers were elected: W. J. Lewis, formerly General Manager, President, succeeding A. L. Hopkins; F. P. Moore, Vice-President; E. E. Gardner, of New York, Treasurer, and R. H. Monsees, of New York, Secretary. (See these columns for Dec. 25, 1896.)

Texarkana & Fort Smith.—At a meeting of the stockholders of this company, whose line forms a part of the Kansas City, Pittsburgh & Gulf, at Texarkana, Ark., Dec. 11, the entire board of old directors resigned, and were succeeded by Rush H. Barnes, C. J. Snooks, A. R. Weir and F. A. Williams, of Kansas City, Mo., and F. M. Hammond, of Port Arthur, Tex.

Texas Midland.—F. M. Raike, heretofore in the General Manager's office at Terrell, Tex., has been appointed Assistant General Manager, effective Dec. 20, with office at the same place.

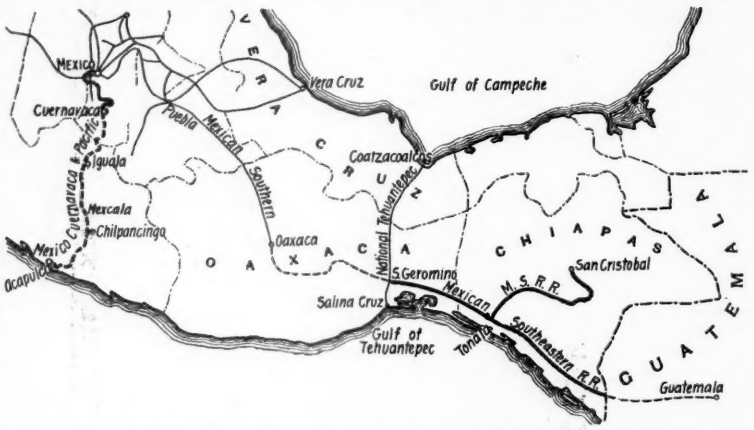
Washinton, Wesminster & Gettysburg.—At a meeting of the Directors held at Frederick, Md., Dec. 10, the following officers were elected: Dr. J. B. Colegrove, of Washington, D. C., formerly Vice-President, was elected President; T. Herbert Shriever, of Union Mills, Md., Vice-President; H. A. Cady, of Washington, Secretary, and William P. Thomas, of Westminster, Md., Treasurer.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Alaska Roads.—J. M. Underwood, of San Francisco, Cal., President of the Alaska Central, is in Washington in the interest of this company, which was recently incorporated in California to build a narrow gage line from tidewater, Prince William's Sound, which is about 100 miles west from Mount St. Elias north up the

valley of the Copper River, then eastward across the divide to a point on the Yukon River near the eastern boundary line. The general land laws pertaining to the territories of the United States do not extend to Alaska. The company is seeking legislation from Congress permitting the building of this road. Mr. Underwood states that engineers have been surveying the route for the past three years, and that the line, if built, can be used for nearly five months of the year. (See this column for Sept. 17.)

Altoona & Beech Creek Terminal.—This company was incorporated in Pennsylvania Dec. 18, with a capital stock of $150,000, to build a line in Blair County from Juniata Junction on the Altoona & Beech Creek to or near Ninth street in the city of Altoona, with the privilege of building branches, sidings, etc. The directors are Samuel P. Langdon, Philadelphia, President; G. T. Simonton, Lewis G. Dutton, Joseph A. Baker, F. S. Fouser, all of Philadelphia; W. L. Shellenbergh and S. S. Fouse, of Altoona.



Lines of the Mexico, Cuernavaca & Pacific and the Mexican Southeastern.

Arkansas & Choctaw.—It is officially stated that engineers are in the field running a preliminary survey for about 12 or 15 miles of extension west from the present terminus, but the exact route has not yet been fully determined. W. H. Carson, of Texarkana, Tex., is Superintendent. (See this column for Dec. 10).

California Southern.—It is reported that this line has been completed from Kramer, Cal., north to Johannesburg, within three miles of Randsburg, the proposed present terminus of the road. A. A. Daugherty, Los Angeles, Cal., is President. (See this column for Nov. 23.)

Canadian Pacific.—It is reported that building has been begun on the Kootenay Lake end of Crow's Nest Pass extension, and that sub-contracts will be let for 70 miles of the road, from Goat River east. The road as proposed is to run from Lethbridge, B. C., west 330 miles to Nelson. (See this column for Sept. 24.)

Chicago, Indiana & Eastern.—It is reported that the people of Sims Township, Grant County, on Dec. 15, voted a subsidy of about $10,000 to this road, which is projected to run from Converse southeast 79 miles to Richmond. (See this column for Nov. 12.) H. E. Drew, of Fairmount, Ind., is General Manager.

Corvallis & Eastern.—This company has been incorporated in Oregon with a capital stock of $2,500,000 to build and operate a line of railroad from Yaquina Bay east to Snake River in Malhaur County, with a branch from some point on this line near Prineville south to California. The plan includes the purchase of the Oregon Central and Eastern, which extends from Yaquina east to Idahua, Ore., 141.8 miles.

Erie.—A letter from the Chief Engineer states that the second track of the New York & Greenwood Lake, from its junction with the Newark Branch of the Erie to Caldwell Junction, N. J., was put in operation last week over the entire distance of 13 miles. All the work is completed except the interlocking plant at Caldwell Junction and a new bridge over Spruce street at Bloomfield, N. J., which was only recently started, in order to still further avoid crossings of streets at grade.

This work of double-tracking presented unusual difficulties, especially between Arlington and North Newark. Within this distance of one mile the railroad crosses the Passaic Valley after leaving a long cut 80 ft. deep at Arlington. Owing to the necessity of utilizing the foundations of the old piers which carried the bridge of the single track over the Passaic River, the second track could not be built on either one side or the other of the old one, but the center of the existing track had to be made the center of the double track. This involved the widening of the rock cut referred to some 10 ft. on each side of the second track now used, a piece of work full of difficulties, when it is considered that heavy suburban traffic had to be maintained without interruption.

The trouble was considerably aggravated by the closely adjoining drawbridge over the river, which had to be entirely re-constructed for both tracks, the masonry as well as the superstructure. At the same time navigation had to be kept open. Fourteen other bridges over the streets and highways, including one over the Second River and one over the Morris Canal, had to be built for both tracks, since the masonry, as well as the superstructure of the old track, never was first class and had been constructed under great financial distress by the old company. Of course, the full benefit of this second track will not be felt for some time to come. Embankments are still settling and the ballasting will have to be gone over again, but by next summer the New York & Greenwood Lake will be, in every way, a first-class suburban railroad.

In connection with the second track, the suburban terminus has been moved from Little Falls and Pompton Junction to Midvale, N. J., 33 miles from New York, and the piece of single track from Caldwell Junction to Midvale, 15 miles, has been provided with passing sidings at Little Falls, Wayne and Pompton. These passing sidings are each provided with an interlocking plant, where all the switches and signals are turned and set from a tower.

Illinois Central.—It is officially stated that the second main track from Carbondale, Ill., south to Bridge Junction, near Cairo, a distance of 53 miles, will be completed by Jan. 1.

Granger Railway.—This company has been incorporated in Minnesota to build a line from Mantorville, Minn., the terminus of the Mantorville branch of the Chicago & Great Western, southeast about 50 miles to Granger, a point on the border line of the state. The incorporators are D. M. Hunt, J. O. Jones, L. S. St. John, R. R. Wickham, F. A. Crowell, D. J. C. Lange, F. A. Gowdy, all of Granger; John Ludwig, Abe. Privat, John T. Drummond, John Sims, of Florenceville, Ia.; T. A. Harstad, of Harmony, Minn, and A. D. LaDue, of Mantorville.

Great Northern.—It is officially stated that five miles of rails have been laid on the Coal Spur from Sand Coulee to Cottonwood, about 6¼ miles. Frank Lewis, of Belt, Mont., has the contract.

Greenbrier.—At a meeting of the stockholders of this company, held at Huntington, W. V., Dec. 16, it was decided to begin operations at once on this road, recently incorporated to run from White Sulphur, a point on the Chesapeake & Ohio, northeast about 80 miles up the Greenbrier River to the fork of the river. Engineers are to be put put into the field to make surveys so that building may begin as soon as spring opens. (See this column for Nov. 26.)

Kansas City, Osceola & Southern.—It is stated that George S. Good & Co., of Lockhaven, Pa., has obtained a contract for building the proposed extension from Osceola, Mo., southeast 40 miles to Bolivar, to connect with the St. Louis & San Francisco. (See this column for Dec. 10.)

Little Kanawha Valley.—It is stated that with fair weather this road will be completed and trains running from Parkersburgh, W. Va., to Elizabeth by Jan. 1. The steel bridge over Slate Creek was completed last week. The track has been laid up to the bridge from Parkersburgh end and was completed to Daly's Run at the close of the week. The headquarters of the contractors and engineers, located in a house-boat at Leachtown, were removed to Newark, Dec. 18. Two hundred graders are at work at Elizabeth, and the trackayers are following closely. A contract was let Dec. 18 for rails, frogs and switches for the road from the Wood County line to a point 3¾ miles toward Elizabeth, which practically completes 30 miles of the road. The second installment of $20,.00 of the Wood County bonds has been delivered by the Court. (See this column for Nov. 19.) Thomas Pettegrew, of Parkersburgh, is Chief Engineer.

Long Island.—It is officially stated that the grading, masonry and foundations for a viaduct are under way on the Great Neck & Port Washington extension of the North Shore terminus northeast 4.25 miles to Port Washington. Two steam shovels and 100 men are at work. The contract for grading, masonry and tracklaying has been awarded to Holmes & Covert, of Jersey City. The grading is heavy, being 79.2 ft. per mile; the maximum curve is 6 deg. There is to be one masonry arch over a driveway, one steel viaduct 70 ft. long, two short I beam spans and four steel highway bridges. Work is being carried on by W. A. Cattell, 26 Court street, Brooklyn, N. Y. (See this column for Nov. 12.)

Mexican International.—It is reported that an extension is to be made from Durango, Mex., west 150 miles to the port of Mazatlan, on the Pacific Coast. The final surveys were completed over a year ago, and are said to have been approved by the Mexican government.

Mexican Southeastern.—This road commences at San Geronimo, a point on the National Tehuantepec, and runs southeast through the states of Oaxaca and Chiapas along the Pacific slope to the frontier of the Republic of Guatemala, a distance of about 425 km. (264 miles), with a branch from a point about midway on the main line at Tonala, northeast across the mountain or continental divide to a point at or near the Chiapas River, a distance of about 213 km. (131 miles).

The Federal government is pledged to pay the concessionaires or their assigns a subvention of $6,000 per kilometer on the road constructed on the main line from San Geronimo to the frontier of Guatemala, and $8,000 per kilometer on the branch line from Tonala to the Chiapas River, in bonds of the Federal government bearing interest at the rate of 5 per cent. per annum, said payments to be made by the government to the company on completion by it of sections of 100 km. In addition thereto the state governments of Oaxaca and Chiapas are pledged to pay a subvention of $1,500 per kilometer in cash, in ten equal annual installments, beginning when the entire line is constructed.

It is proposed by the company to issue $8,000,000 of five per cent. gold bonds for construction and equipment purposes on the entire line and branches. The proceeds of these bonds will be amply sufficient to build and equip the road, and the subsidy bonds given by the Federal and state governments, amounting in the aggregate to about $5,000,000, will be held in the treasury of the company as a sinking fund to provide for the payment of the company's bonds and interest.

The company is carrying on the work of construction by subscription of the stockholders, and no attempt will be made to place bonds until enough of the road is completed to show good earning power. The main line of the road runs along the Pacific slope from 15 to 40 miles from the Pacific Ocean through the most healthy and most thickly settled states of Mexico. The road for a distance of 275 miles will serve a population of one-half million people who are thrifty and industrious, and raise crops of all kinds. All tropical fruits, coffee, sugar, corn and vegetables grow in abundance. The line passes through a town about every 10 or 12 miles, these towns ranging in population from 500 to 10,000. The amount of freight and passenger traffic that already exists, were a road built, is amply sufficient to make the road pay, to say nothing of the immense mahogany forests that the road passes through, the carrying of which timber alone would show a very large earning power for a great many years.

A contract has been let for grading the first 50 km. (31 miles) from San Geromimo. This section is practically completed. Bridge timber for the first 50 km. is on the ground and for the second 50 km is on the way. About 2,500 men are at work, but there is very little team work as yet. Independent companies are building connections northeast to Oaxaca, now connected by the Mexican Southern with the City of Mexico, and southeast in the City of Guatemala, which it is expected will be completed at about the same time as the Mexican Southern. John D. MacLennan, of Cleveland, O., is General Manager. (See this column for Oct. 8.)

Mexico, Cuernavaca & Pacific.—The map here given shows the line of this road, which is to run from the City of Mexico southwest through Cuernavaca to the Pacific coast. As stated last week in this column, the road has been completed and is in operation from the City of Mexico to Cuernavaca, 119.5 km. (74 miles) Grading is finished to a point 11 km. south of Los Amates, and from a point 5 km. north of Puente de Ixtla to San Jose. Graders are at work in both directions between Cuernavaca and San Jose. G. A. Stranahan, of the City of Mexico, is Construction Engineer.

Mississippi River & Bonne Terre.—Official denial is made of the report, which appeared in this column two weeks ago, that plans are under consideration for extensions south to Memphis, Tenn., and north to St. Louis, Mo. At no time has it been intended to make an extension north. A southern extension has been talked of, but no plans are at present under consideration.

Monterey & Mexican Gulf.—It is stated that surveys are being made for an extension of this road from Tampico, Mex., south about 250 miles to the City of Mexico, and that financial arrangements have been completed for the proposed extension.

New Roads.—The Pennsylvania Joint Lumber Co., of Williamsport, Pa., is building a logging road from Sinnemahoning, a point on the Pennsylvania, running up Grove Run five miles. The grading is about completed, but it is not expected that the rails will be laid until February or March. The maximum grade is three per cent. Judge B. W. Wykoff, of Sinnemahoning, has the contract.

Engineers are reported to be surveying for a new line of railroad from Reynoldsville, Pa., a point on the Allegheny Valley, south about 16 miles to Punxsutawney, on the Pennsylvania & Northwestern.

The Crown Fire Clay Co., of Canal Dover, O., is reported to be building a road parallel with the C. L. & W. from its works to Canal Dover, to connect with the Pennsylvania lines. A. Swancen, of Coshocton, O., has the contract for grading.

Pecos Valley & Northeastern.—It is reported that J. J. Hagerman, of Colorado Springs, Colo., President, has secured the funds for building this road, and that work will begin at an early date. The proposed extension is from Roswell, N. Mex., northwest about 220 miles, to Panhandle, Tex., on the Atchison, Topeka & Santa Fe.

Pennsylvania.—Contracts for the improvements on the main line between Altoona, Pa., and the Gallitzin tunnel have been let to Drake & Stratton and W. E. Howley & Co., of Pittsburgh, and to the McManus Construction Co., of Philadelphia. The work on the Portage tunnel has been given to Clements, King & Co., of New York. (See this column for last week.)

Pittsburgh, Connellsville & Baltimore.—It is officially stated that this company expects to let contracts before the holidays for its entire line of about 14 miles in Fayette County, Pa. John G. Hosick, of Springdale, Pa., is Secretary.

Plant System.—It is officially stated that construction is going on as rapidly as possible on the Southwestern Alabama extension. This new line starts at Dimmick, a point on the Alabama Midland, at the west bank of the Choctohatchee River, running southwest through Daleville, Enterprise and Clintonville to Elba, the county seat of Coffee County, on the west bank of Pea River, southwest 36 miles. The contract for the grading, clearing and curving across ties and trestles was let in June to W. F. Vandiveer, of Montgomery, Ala. About 10 miles of track had been laid and there are now on the work about 300 mules and between 400 and 500 men. The grading consists almost exclusively of earthwork. The maximum grade is one per cent. and curvature six degrees. There will be only two short bridges, one at Clay Bank Creek, about 60 ft. long, and another at Pea River, about 140 ft. long. The work is being financed by the Plant Investment Co. The names of the officers are given in another column.

St. Louis, Mansfield & Ava Southern.—It is reported that work was begun at Mansfield, Mo., Dec. 15, on this road, which is projected to extend from Mansfield south to Ava. The Ozark Construction Co., of Springfield, Mo., has the general contract.

Sanford & Cape Porpoise.—A letter from the Maine Board of Railroad Commissioners states that the Commission has approved of the location of this railroad, the company for building which has been organized under the general state law. The road is projected to run from Sanford, in York County, east about 31 miles, through Alfred, Lyman, Kennebec and Kennebunk Port to Cape Porpoise, on the Atlantic coast. It is to be built both for freight and passenger traffic. Fred J. Allen, of Sanford, Me., is attorney for the company.

Short Line.—Contracts have been let for building the entire line from Clarksburg, W. Va., northwest about 25 miles to New Martinsville, on the Ohio River. It is stated that two steam shovels and 300 men will be at work on the first 10 miles west of Clarksburg before Jan. 1. This force will clear some of the most difficult places during the winter preparatory to grading, filling, bridge and culvert building in the early spring. (See this column for Dec. 10.)

Sistersville & Salem.—This company has been incorporated in West Virginia to build a line from Sistersville, Tyler County, on the Ohio River, along Elk Fork and McEllery Creek to Salem, W. Va., a point on the Baltimore & Ohio. The incorporators are C. J. Benedum, D. H. Marey and W. H. Smith, of Middlebourne, W. Va.; R. H. Freer, of Harrisville, W. Va.; W. R. Fitch, of Martinsville, W. Va.; A. B. Smith, of Martinsburg, W. Va., and F. C. Clemings, of Marietta, O. This is practically the same road as the Sisterville & Mannington, which was chartered about two years ago. It is proposed to build the road as a carrier for supplies, pipes, tankage, etc., to the oilfields. It is stated that preliminary surveys have been made, and that the Standard Oil Company is backing the enterprise.

Southeastern & Atlantic.—It is reported that work is being rapidly pushed on this belt line around Norfolk and Portsmouth, Va. The new road is graded from a connection with the Norfolk & Southern to Elizabeth River, and tracks are being laid on this section. The company is also laying tracks at the junction of the Atlantic Coast Line at Port Norfolk eastward toward

the Elizabeth River. The work of grading the New York, Philadelphia & Norfolk's new yard, near the Atlantic Coast Line junction is almost completed. Joseph U. Crawford, of the Broad Street Station, Philadelphia, is Chief Engineer. (See this column for Nov. 12).

Speedwell Lake.—It is officially stated that this company, whose organization was noted in this column last week, is to build a line at the terminus of the Rockway Valley, at or near Watnong Station, in the township of Morris, N. J., southeast one mile, through Speedwell Iron Works, to a point beyond Speedwell avenue, within the corporate limits of Morristown. A survey has been completed, and it is proposed to begin building at once. No time has been set for letting contracts, and it has not yet been determined whether the road will be built by independent contractors. The funds are to be furnished by the stockholders. This road is an organization independent of the Rockway Valley. The officers are given in another column.

Springfield, Little Rock & Gulf.— It is reported that Chief Engineer P. J. Daugherty, on Dec. 15, filed the first 10 miles of new survey from Little Rock, Ark., south to Dardanelle, and that the contract for grading the first three miles has been let to J. H. McCarthy, who began at once to work at construction in Owen Township, near Little Rock. The road is projected to extend from Springfield, Mo., south through Little Rock to Alexandria, La.

Stillmore Air Line.—This company is building an extension of two miles on the main line at Stillmore, Emanine Co., Ga., of which 1,100 ft. has been completed. The road extends from Collins, Ga., to Swainsboro, 33 miles. G. M. Brinson of Stillmore, Ga., is President.

Wheeling & Lake Erie.—The grant of the use of the river bank along the Ohio, through Martin's Ferry, for an extension of this line from its terminus two miles to Bridgeport, having expired through failure of the company to complete the work within the time limit, a new grant has been asked for. This the City Council has given, but with conditions which may render its acceptance of doubtful propriety, since the railroad, by accepting the new conditions, would obligate itself to change its plans and rebuild a part of the road already completed.

It is reported that the Dillonvale Tunnel at Martin's Ferry will be abandoned and a cut made through the hill. The tunnel is 450 ft. long, and 94 ft. below the summit of the hill. Contractor T. J. Stringer, of Portland, O., has been given the work. The reason given for making the change is that the roof of the tunnel is of loose shale which cannot be made safe except by arching with stone, which would be about as expensive as the open cut.

Electric Railroad Constru

Brooklyn, N. Y.—The Brooklyn Heights Co. has placed a number of man at work laying the switches and tracks necessary to make the connection at the Brooklyn terminus of the southern roadway of the Brooklyn Bridge. The switches will enable the cars to make connections at Fulton street and the Bridge Plaza with its line. No further efforts will be made to connect the tracks at the northern roadway.

Buffalo, N. Y.—The Buffalo Traction Co. is arranging to build many miles of additional track in accordance with the original franchise granted to the company. The plans have been approved by the Council and the Mayor, and it is expected they will be carried out early in the spring.

At a meeting of the Directors of the Buffalo, Hamburgh & Aurora Railroad, held Oct. 15, it was decided to proceed with the construction of the road. It is stated that bids will be advertised for in a short time, and its probable that contracts for the road will be let not later than Feb. 1. Ground will be broken for the road early in the spring. A power-house will be located in the town of Hamburgh and will contain three engines and boilers of 100 H. P. each.

Camden, N. J.—At a meeting of the Stockton Council Dec. 14 an ordinance granting the Camden & Suburban Railway Co. a right to lay tracks on the River road and on Westfield avenue was passed. The ordinance gives the company the option of paving, if it so desires.

Catskill, N. Y.—The prospects are good for the construction of the Catskill & Cairo Electric Railroad, and it is probable that active work will be begun in the spring. The property owners have agreed to give the necessary land for a reasonable price.

Chicago.—Recent press dispatches report that sufficient money has been raised to complete the Northwestern Elevated Railroad, and that the road will be finished and in operation by Oct. 1 of next year: the amount needed for this work is approximately $3,500,000. We are informed, however, by the President of the Northwestern Elevated that the arrangement for the money is not yet completed, and that there are certain legal matters which must first be arranged. It is the general opinion, however, in Chicago, that this work will be commenced at an early date.

Cranford, N. J.—At a public meeting at Cranford, N. J., on Tuesday of this week, the citizens unanimously voted against the electric line on the County road, which it was proposed would be built at public expense and leased to a private corporation. At the same meeting the citizens recommended the township committee to grant a franchise to the Westfield & Elizabeth Street Railway Co. to build an electric road on South avenue. President Riker, of the electric railroad, stated that the company would pay town taxes and share its receipts, and would keep the street occupied in good condition.

Depew, N. Y.—The Depew & Blazedell Electric Railroad is being built. The ties and rails have been laid nearly the entire distance.

Elizabeth, N. J.—The Westfield & Elizabeth Street Railway Co. is making arrangements to build an electric line on the south side railroad tracks between the places mentioned in the title. It is claimed that all the necessary consents have been secured.

Elkton, Md.—The Cherry Hill, Elkton & Chesapeake Electric Railroad Co. held a meeting in Elkton Dec. 15 to make an effort to secure from the coming legislature the $58,000 which now stands to the credit of the Elkton & Southern Railroad. The company claims that with this sum it will be enabled to build an electric line from the Pennsylvania line to Chesapeake City.

Greensburg, Pa.—At a meeting last week of the Council of South Greensburg borough, the right of way through the town was granted to the Greensburg & Mt. Pleasant Street Railway Co., a charter for which was obtained some months ago.

Lewiston, Me.—Work on the electric line between Bath, Brunswick and Lewiston will be started in the spring in order to have the road open by July.

Lykens, Pa.—On Dec. 14 a charter was granted to the Lykens & Williamstown Valley Street Railway Co., with a capital stock of $200,000; to build an electric road between Lykens and Johnstown, a distance of 10 miles. The road, as proposed, will pass through Wicoisco, Williamstown, Tower City and Beaumont. The Directors include John B. Skiyles, Martinsburg, Pa., President: C. C. Cocklin and William E. Fletcher, Harrisburg.

Mahanoy City, Pa.—It is stated that the Schuykill Traction Co. will build an electric line from Mahanoy City to Brandonville and thence to Sheppton and Oneida

New Brunswick, N. J.—The New Brunswick Traction Co. is making preparations for opening an the new electric line from New Brunswick to Bound Brook. Work on the Albany street branch will be finished in the course of a week.

New Rochelle, N. Y.—The Village Trustees have decided to postpone the consideration of the electric railroad franchise. This action appears to be taken in order to give other companies opportunity to apply for a franchise over practically the same route.

Norfolk, Mass.—The Norfolk Southern Street Railway Co. was organized Dec. 1 for the purpose of building an electric road from Norwood through Walpole and Foxboro to Mansfield. With the completion of this line a connecting link will be made between Boston, Providence, Fall River and New Bedford. The officers are: President, F. S. Lane; Vice-President, J. C. Lane; Clerk and Treasurer, E. F. Draper.

Parkersburg, W. Va.—The Parkersburg & Suburban Railway Co., to which the City Council of Parkersburg W. Va., a few weeks ago granted a franchise permitting the use of the streets for an electric railroad, has been granted a franchise by the County Court, Wood County. Provision has been made for a 5-cent fare, under three miles, and for maintaining roads. Work must be completed and cars running within one year. Engineers are making the final surveys and locations, and construction will begin not later than Jan. 15.

Salisbury, N. C.—D. L. Risley, of Philadelphia, writes that the Salisbury Street Railway Electric Co. has been formed, with the following Directors: Hon. John S. Henderson, Hon. Kerr Craige, Hon. Lee S. Overman, Theo. F. Kluttz, Jos. J. Newman, J. Samuel McCubbins and R. J. Holmes, of Salisbury, N. C.; D. L. Risley, of Philadelphia, and R. S. Smythe, of Pittsburgh. A charter has been applied for from the state. It is proposed to build 10 miles of track, but not more than three miles will be built this year, the stock for which has been subscribed.

Southfield (S.I.), N. Y.—The Staten Island Electric Railway Co. has filed with the Secretary of State a certificate for an extension in Southfield, along the south side of the boulevard, for a distance of 5½ miles.

Syracuse, N. Y.—The Onondaga Lake Railroad Co. has made an application to the Board of Trustees of Baldwinsville for a franchise to build a road through Baldwinsville. The company expects, however, to eventually extend the proposed Lake Side road. A hearing on granting the franchise will be begun Dec. 27, and it is expected that favorable action will then be taken.

Wheeling, W. Va.—The Wheeling Railway Co. is securing consents for an extension of its main line in Martin's Ferry, O., a distance of two miles.

GENERAL RAILROAD NEWS.

Burlington & Missouri River.—Holders of six per cent. consolidated mortgage bonds, due July 1, 1819, are notified that 112 bonds for $1,000 each and 21 bonds for $600 each have been drawn for payment, with accrued interest on Jan. 1, 1898, at the office of the New England Trust Company, Boston, Mass. After that date interest will cease in conformity with the terms of the trust deed.

Centralia & Chester.—Judge Allen, of the United States Circuit Court, at Springfield, Ill., has given Receiver E. N. Forman, authority to issue $175,000 additional Receiver's certificates to be used for equipping the road. This line extends from Evansville, Ill., to Centralia, 61.5 miles, with a branch from Sparta. (See this column for Nov. 26.)

Central Pacific.—The earnings for the month of October and the ten months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc.
Gross earn	$1,523,391	$1,320,358	$203,033
Oper. expen	768,090	706,890	61,200
Net earn	$755,301	$613,468	$141,833
Ten months:			
Gross earn	$11,632,058	$10,438,892	$1,193,166
Oper. expen	6,679,317	6,435,605	243,712
Net earn	$4,952,741	$4,003,287	$949,454

Chicago & Northern Pacific.—A. L. Hopkins, Receiver of this company, on Dec. 13 presented to Judge Jenkins, of the United States Circuit Court of Chicago, his final report on the condition and disposition of the affairs of this company, and was relieved of his duties as Receiver. The road was sold at the master's sale July 1, to the Chicago Terminal Transfer Company, of which line it has now become a part. (See this column for June 11.)

Chicago, Burlington & Quincy.—The earnings for the six months ended June 30 were as follows:

Six months:	1897.
Gross earn	$16,941,818
Oper. exp	11,779,424
Net earn	$5,162 424

The fiscal year of the company has been changed so as to begin July 1.

Chicago, Great Western.—The earnings for the month of November and the five months ended Nov. 30 were reported as follows:

November:	1897.	1896.	Inc.
Gross earn	$474,147	$319.848	$154,299
Oper. expen	334,965	267.388	67.637
Net earn	$139,182	$52,520	$86,662
Five months:			
Gross earn	$2,398,094	$1,918,526	$419,568
Oper. expen	1,599,936	1,445.306	154 630
Net earn	$798,158	$533,220	$264,938

Chicago Terminal Transfer.—The $26,430,000 of United States Trust Company's certificates will be exchanged Jan. 1 for bonds and shares of Chicago Terminal Transfer Co. in accordance with the plan of reorganization given in this column for May 14.

Colorado Midland.—This company, on Dec. 17 gave a first mortgage to the Central Trust Company, of New York, for $10,000,000 to secure an issue of 50-year interest-bearing gold bonds, payable July 1, 1947. This mortgage is under the proposed plan of the reorganization as given in this column for June 25.

El Paso & Northeastern.—It is stated that W. A. Hawkins, of El Paso, Tex., General Attorney for the road, appeared before the Texas Railroad Commission Dec. 17, and asked for authority to issue $400,000 bonds on 21 miles of this road in Texas. Of this $100.000 is for building terminals. The road is projected to extend from El Paso northeast 165 miles through New Mexico to White Oaks. (See this column for Dec. 10.)

Fort Plain & Richfield Springs.—The sale of this road at public auction has been postponed to Dec. 31, to take place at Herkimer, N. Y. (See this column for Nov. 12.)

Hutchinson & Southern.—The sale of this road has been announced to take place Jan. 14, at the court house in Hutchinson, Kan., under Special Master Hiram P. Dillon. The complainant is the Metropolitan Trust Company of New York, who is trustee of the bondholders. The road is to be sold in two parts; the section between Hutchinson and Cameron, 82 miles, is to be sold first, the upset price being $35,000. Following this will be the sale of the second section, from Cameron to Wakita, 12 miles, the upset price being $65,000. Ten miles additional to Medford has been completed, and 26 miles more to Blackwell, Okla., has been graded, and it is expected that track-laying will begin Jan. 1. A receiver was appointed Aug. 9, 1893.

Illinois Central.—The interim certificates issued for the St. Louis, Alton & Terra Haute common stock and the Belleville & Illinois preferred stock will be exchanged on Jan. 1, 1898, for the new St. Louis Division & Terminal 3 per cent. bonds under the plan of reorganization detailed in this column for May 28.

Jacksonville & St. Louis.—This road was sold at master's sale, at Mount Vernon, Ill., Dec. 14, to Marshall P. Ayers, of St. Louis, Mo., for $127,000. This is a portion of the Jacksonville, Louisville & St. Louis, and runs from Centralia, Ill., to Drivers, 16.4 miles. (See this column for Nov. 19.)

Kanona & Prattsburg.—It is stated that this company has recently paid $1,500 to the Atlantic Trust Company for interest on the bonds of the road, the first payment of interest made from the beginning of the road's history. The company has $192,000 of 5 per cent. 30-year gold bonds outstanding, issued April 8, 1888.

Long Island.—The earnings for the fiscal year ended June 30 were reported as follows:

Year:	1897.	1896.	Inc or Dec.
Gross earn	$3,964,841	$3,962,799	I. $2,042
Oper. expen	2 467,210	2,742,608	D. 275,398
Net earn	$1,497,631	$1,220,191	I. $277,440

Lawrence & Emporia.—Hiram P. Dillon, of Topeka, Kan., has been appointed receiver of this road. He is not authorized to increase any expenses or to receive any fees. The road was built in 1881, from Lawrence, Kan., to Emporia, 80 miles, and it formed a branch of the Union Pacific until 1887, when it was abandoned. Suit was instigated recently by persons through whose property the right of way runs for the recovery of the land.

Louisville & Nashville.—The plan under consideration for meeting the $7,070,000 of consolidated 7 per cent. bonds, maturing April 1, 1898, and for funding the debt incurred in the purchase of the Paducah & Memphis division. It is proposed to issue collateral trust bonds for about $12,000,000, maturing in ten years, but subject to call at the end of two years from date of issue, which is to be secured by Louisville & Nashville unified bonds, the Paducah & Memphis division bonds, and other securities owned by the company.

Missouri, Kansas & Texas.—The earnings for the month of October and the four months ended Oct. 31 were as follows:

October:	1897.
Gross earn	$1,403,555
Oper. expen	743,446
Net earn	$660,109
Four Months:	
Gross earn	$4,445,809
Oper. expen	2,693,079
Net earn	$1,752,730

Monterey & Mexican Gulf.—The Supreme Court of the Republic of Mexico has made a final decision in the case of the Belgian bondholders syndicate, which purchased this road after its bankruptcy. The purchasers were compelled to deposit $4,000,000 as guarantee for the payment of the claims of their creditors, but the Court now rules that no such obligation exists. The road extends from Trevino, southeast, 387 miles, to Tampico, and was built by American contractors.

New York Central & Hudson River.—The estimated earnings for the quarter and the six months ended Dec. 31 are reported as follows:

Three months:	1897.	1896.	Inc. or Dec.
Gross earn	$11,800 000	$11,668,564	I. $131,436
Oper. expen	7,869,700	7,897,319	D. 27,619
Net earnings	$3,930,300	$3,771,245	I. $159,055
Six months:			
Gross earn	$24,214,000	$22,938,463	I. $1,275,537
Oper. expen	15,962,000	15,494,087	I. 267,913
Net earn	$8,252,000	$7,444,376	I. $807,624

Northeastern.—The Georgia Legislature, on Dec. 15, passed a bill authorizing the sale of this road at a time not named. The minimum price is fixed at $287,000. This road, which extends from Athens, Ga., to Lula, 39 miles, has been operated since Nov. 23 by R. K. Reaves, Special Agent of the State. Default was made in interest due Nov. 1, 1893, on the first mortgage bonds, and the road was taken possession of Nov. 20 following by the State. It was sold April 16, 1895, to the State, which leased it in May, 1896, to F. A. Richards & Co., at an annual rental of $18,600. In July, 1896, the Tennessee, Georgia & Atlantic was organized to purchase this road and to extend it from Lula to Augusta.

Oregon Short Line & Utah Northern.—Upon application of the American Loan & Trust Co., Judge

Knowles, in the United States Circuit Court, at Salt Lake City, Utah, entered a decree for a deficiency judgment of $1,049,799 against this old company, recently reorganized as the Oregon Short Line. This is the amount still due on the bonds of the foreclosure sale.

Peoria, Decatur & Evansville.—Judge Allen, of the Circuit Court of Omaha, Neb., issued an order on Dec. 17 directing the payment of the July interest on the bonds of the Peoria Junction. The January interest was paid July 29. The first mortgage holders' committee has opposed the payment of interest, claiming that the earnings are insufficient. This decision gives the second-mortgage bondholders another opportunity to avoid foreclosure.

Holders of first and second mortgage bonds and holders of stock are not fied that the limit of time for their deposit with the New York Security & Trust Co., representing the Reorganization Committee, has been extended from Dec. 1 to Dec. 31. After that date first mortgage bonds will be received for deposit upon the payment of one per cent. penalty, and second mortgage bonds and stock upon payment of the first installment of the assessment with interest at six per cent. per annum from Nov. 1, 1897.

Pittsburgh & Western.—The earnings, including leased lines, for the year ended June 30 were reported as follows:

Year:	1897.	1896.	Inc. or Dec.
Gross earn	$2,768,507	$3,091,302	D. $322,795
Net earn	956,084	981,223	D. 25,139
Fixed charges	1,002,370	945,971	I. 56,399
Deficit	$46,286	sur. $35,252	I. $81,538

The heavy loss in gross revenue is attributed by the Receiver to the reduction of rates on ore and coke to furnaces, also to the general business depression which existed all through the year and severely affected the iron and steel industries. Many furnaces, mills and factories for which the road handles a very large tonnage in ordinary times were closed down for several months.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The earnings for November and the 11 months ended November 30 were as follows:

November:	1897.	1896.	Inc. or Dec.
Gross earn	$1,384,294	$1,098,621	I. $285,673
Oper. expen	859,907	783,637	I. 76,540
Net earn	$524,387	$314,984	I. $209,133
Eleven months:			
Gross earn	$13,580,709	$13,208 683	I. $372,026
Oper. expen	9,273,673	8,834,531	D. 439,142
Net earn	$4,307 036	$4,374,152	I. $811,168

St. Louis & San Francisco.—The sale of the Central Division of the Atlantic & Pacific, a branch of the St. Louis & San Francisco, took place at Vinito, I. T., Dec. 19, E. A. Henderson bidding $2,200,000. Mr. Henderson is General Counsel of the St. Louis & San Francisco, and the property was at once transferred to that road. The sale was under decree of foreclosure of the Federal Court. (See this column for Nov. 19). The road extends from Seneca, Mo., southwest 112 miles, to Sapulpa, I. T. The sale is stated to be for clearing the title with a view to its extension into Oklahoma.

Southern Pacific of California.—The earnings for the month of October and the 10 months ended Oct. 31 were reported as follows:

October:	1897.	1896.	Inc. or Dec.
Gross earn	$916,769	$949,172	D. $32,403
Oper. expen	504,052	512,843	D. 8,791
Net earn	$412,717	$436,329	D. $23,612
Ten months:			
Gross earn	$8,395,835	$8,289,805	I. $106,030
Oper. expen	4,863,403	5 257,051	D. 393,648
Net earn	$3,532,432	$3,032,754	I. $499,678

Texarkana & Fort Smith.—At the annual meeting of the Board of Directors at Texarkana, Tex., Dec. 11, it was voted to apply for a new charter, changing the name to the Kansas City, Pittsburg & Gulf, of which road it is practically a part It was also decided to seek authority to transfer headquarters from Texarkana to Fort Smith.

Toledo, St. Louis & Kansas City.—Judge Taft, of Toledo, O., has granted the application of the preferred stockholders for additional time to take testimony in opposing the answer of the company, signed by its President, S. H. Kneeland, as a cross bill of the preferred stockholders, charging that the clause which made the preferred stock a second lien was inserted without the authority of the Board of Directors. The motion for the decree will be made Jan. 15. (See this column for Nov. 5.)

Union Stock Yards and Terminal.—This company is reported to have concluded the purchase of the Chicago, Hammond & Western and will make it a part of the stock yards terminal system. The final transfer has not yet been made. The Chicago, Hammond & Western extends from Whiting, Ind., to La Grange, Ill., 30 miles, and has trackage rights from Chapelle, Ill., to the Union Stock Yards over the tracks of the Union Stock Yards and Terminal Co.

Virginia Midland.—At the annual meeting held at Alexandria, Va., Dec. 15, the stockholders adopted the proposal to sell this road to the Southern. The terms of the transfer are on the basis of 10 shares of the Virginia Midland for seven shares of Southern, or a cash value of $21 per share. The Southern has leased this line and owns $4,500,000 of its shares. The road extends from Alexandria, Va., to Orange, 77.54 miles, and from Charlottesville to Junction, 125.18 miles, besides other branches.

York Harbor & Beach.—It is officially stated that this road is to be closed to traffic from Jan. 1 until April 1, this having been deemed for the best interests of the road on account of saving expenses, etc. The road extends from Kittery, Me., to York Beach, 11.27 miles, and forms a part of the Boston & Maine, which owns $248,550 of the total $300,000 capital stock.

Electric Railroad News.

Allentown, Pa.—A decision has been handed down in the case of the Old Colony Trust Co., of Boston vs. the Allentown & Bethlehem Rapid Transit Co., in favor of the former. The proceedings were brought to secure the foreclosure of a mortgage for $200,000 on the property of the latter company in Allentown.

Hartford, Conn.—The Hartford Street Railway Co. has raised its capital stock from $200,000 to $1,000,000, the new stock to be offered to shareholders at par, and the money will be used to pay off the floating debt. In addition, the stockholders will receive $200,000 in debenture bonds, which, when exchanged, will increase the total capital stock to $1,200,000. The company has for years paid six per cent. dividends on its $200,000 capital stock.

Jersey City, N. J.—The Consolidated Traction Co. has filed its statement of the earnings and expenses for November, which shows a surplus over all charges of $10,891, and for the 11 months ending Nov. 31 the total surplus was $72,528.

Mr. John L. Heins, President of the New Jersey Street Railway Co., has been appointed its Receiver, on application of Alexander & Green, acting for the Mercantile Trust Co. The New Jersey Electric Railway Co. operates the lines between Rutherford, Hoboken, Passaic and Paterson, and was organized in 1894. It has not been able, however, to pay the interest on its $4,000,000 five per cent. bonds.

Lincoln, Neb.—The Lincoln Street Railway Co., which operates all the lines in the City of Lincoln, was sold at foreclosure on Dec 17, for $60,500, subject to the lien of the city for taxes to the amount of $60,000. M. L. Scudder, 32 Liberty street, New York, and William Belcher, of New London, Conn., representing the first and second mortgage bondholders, the New York Security Trust Co., and the New York Guaranty & Indemnity Co. were the purchasers. The first mortgage bonds amount to $500,000, with five years' defaulted interest, and the second mortgage bonds amount to $840,000.

New York, N. Y.—The foreclosure sale of the Fulton, Wall & Cortlandt Street Ferries Railroad has been postponed until Dec. 30.

Pittsburgh, Pa.—Messrs. George B. Hill & Co., of Pittsburgh, have succeeded in securing the money for the $1 000,000 subscription to the common and preferred stock of the United Traction Co., of Pittsburgh. This completes the deal whereby this company secures control of the North Side, the Second Avenue, the Pleasant Valley and the Pittsburgh, Allegheny & Manchester traction companies. The United Traction Co. recently declared a semi-annual dividend of 2½ per cent. on the preferred stock.

Rockford, Ill.—Mr. J. S. Ticknor has sold his interest in the Rock River Electric Railroad, and a new company has been organized, of which E. M. Hopkins, of Chicago, is mentioned as President, and J. S. Ticknor, Secretary. The right of way is now being secured.

St. Louis, Mo.—The St. Louis & Suburban Railway Co. has purchased a tract of ground containing 200 acres near French Village, and proposes to lay out a park and run excursions during the summer.

Sherman, Tex.—J. Geath, representing an Eastern syndicate, has acquired the Sherman City Street Railway and the Electric Belt Railroad, and also the Denison Street Electric Railway Co. of Denison. A double track connecting between Sherman and Denison may be built by the new company, which is to be known as the Sherman & Denison Twin Street Electric Rapid Transit Co. Two hundred acres of land has already been purchased and will be used as a pleasure park. The extension as proposed will be 13 miles in length.

Terre Haute, Ind.—The Court has granted permission to the Terre Haute Electric Railway Co. to borrow $25,000 with which to purchase boilers and enlarge the capacity of the street railroad and lighting plant.

Watertown, N. Y.—The Watertown & Brownsville Street Railway Co. and the Watertown Consolidated road were sold Nov. 27 under foreclosure of mortgage held by the Central Trust Co., the purchasers being Mayer Lebknecher, of Newark, N. J., and C. T. Cornell, of New York. The price paid is $28,000 above encumbrances.

TRAFFIC.

Traffic Notes.

The Colorado Midland has reduced the price of 1,000 mile tickets from $35 to $30.

The Pacific Coast Steamship Co. will add three steamers to its Alaska line next spring. One vessel is being built at San Francisco and two have been bought on the Atlantic Coast.

The report of traffic to and from Lake Superior for the month of December, through both canals, shows a total eastbound of 334,071 net tons and westbound 98,888 tons, or an aggregate of 432,959 tons.

The argument of the Joint Traffic Association suit before the United States Supreme Court has been appointed for Feb. 21, being postponed on account of the vacancy in the court, which, it is expected, will be filled by the appointment of Attorney-General McKenna.

In Kansas, according to a law passed the present year, it is a misdemeanor for a railroad agent to refuse to give the shipper of a car of live stock a round trip pass, and George M. Williams, Agent of the Missouri Pacific at Gaylord, has been formally complained of by a stock shipper, with a view to testing the law.

The National Board of Trade held its annual meeting in Washington, Dec. 14, 15 and 16. A resolution was passed favoring the passage of the anti-scalper law now before Congress, and another endorsing the proposed law to legalize pooling; but this latter resolution was not unanimous; about one-third of the delegates, those from the West, voted against it.

H. M. Strauss & Co., of Cleveland, in conjunction with other merchants of that city, announce that they are going to complain to the Interstate Commerce Commission because they have to pay $1 a day demurrage on freight cars, while the Cleveland Rolling Mill and the Standard Oil Company are allowed to use cars as storehouses without paying anything. According to a press dispatch the principal witness against the railroads will be A. M. Simmons, formerly Manager of the Cleveland Car Service Association.

Counterfeits of the mileage books of the Atchison, Topeka & Santa Fe have lately been presented to conductors on the trains of that road, and it is said that brokers in Kansas City and Chicago have sold a good many of the fraudulent tickets. An employee of a scalper at Kansas City has been arrested on the charge of complicity in the fraud. Altered tickets of the Pennsylvania lines have been discovered at Indianapolis. The return portion of local round trip tickets is extended by erasing the date on the back side and the substitution of a new date.

Legal and Illegal Excursion Rates.

While the law admits the validity of the special excursion rate, it is obviously to be confined to the well-defined cases of special pleasure outings or exceptional events calling together large numbers of people at a particular place; and for any city to set up its trade advantages and its alleged bargains as constituting such an exceptional event is an intolerable bit of impudence. An administration over government-owned railroads which would make special trade excursion rates for two or three favored places would not stand beyond the next general election; for the diversion of the great transportation interest to the special taxation and robbery of the many places in behalf of the trade and industry and wealth of the few is something that the majority of the people will not endure.—*Springfield Republican.*

Licensing of Truckmen in New York.

At the instance of the Local Freight Agents' Association of New York City, the aldermen of that city have passed an ordinance requiring that all public carts shall be licensed, that the license number shall be painted on the side of the body of the vehicle in large, plain letters and that the driver must have a metallic badge showing his number. Drivers must keep the Mayor informed of their residences, and the ordinance provides suitable penalties for its violation. This action has been taken for the purpose of putting a stop to the practice of getting freight on fraudulent orders, which, it is said, has troubled New York City freight agents for a long time. It is impracticable to enforce strict regulations for the identification of consignees' agents in the delivery of freight, and therefore it is found necessary to employ all available safeguards to discourage dishonest teamsters.

New Orleans Passenger Competition.

Sharp competition has developed at New Orleans on passenger business to the East. The fight is being carried on by the Illinois Central, the Louisville & Nashville and the Queen & Crescent. It started with the purchase by Illinois Central of the Chesapeake & Ohio Southwestern, which gave that company an Eastern line. Illinois Central has made arrangements for passenger travel to New York, and is fighting for business into Louisville. Louisville & Nashville has retaliated by establishing a route from Chicago to New Orleans. Queen & Cresent formerly had the bulk of the business to Cincinnati, but Illinois Central and Louisville are both competing for this business. The time from New Orleans to Cincinnati has been reduced from 30 to 24 hours. The New York schedule has been reduced from 46 to about 38 hours and other time in proportion.—*Wall Street Journal.*

Chicago Traffic Matters.

CHICAGO, Dec. 22, 1897.

Flour rates from Minneapolis have again been reduced to meet Soo competition, making a rate of 25 cents to New York and to Boston 27 cents per 100 lbs. This last reduction was a cut of more than 25 per cent. of the authorized rate of 32½ cents.

Colorado freight rates are to be restored to normal tariff on Jan. 1. The compromise between the Gulf steamers and the all-rail lines was not brought about until the Burlington took the radical action of reducing the rates $2 (first class) below normal tariff.

The western roads are striving to solve the problem of Gulf competition versus all-rail on export grain, and members of the Board of Administration of the Western Joint Traffic Association are now investigating the facilities of the various ports with a view to finding out the true basis of rates by the routes to the Atlantic seaboard direct as compared with those by way of New Orleans and Galveston.

There is more trouble with the Central Passenger interchangeable mileage agreement, particularly concerning the use of this interchangeable ticket in Michigan. The Grand Trunk is not a party to this agreement and the other lines running between Chicago and Buffalo through that state have, in order to ward off hostile legislation, agreed to accept the interchangeable mileage coupons on their trains. This is in violation of the agreement, which requires the issue of an exchange ticket, closely limited, for each trip. The ultimate result of this disturbance probably will be either the adoption of an entirely new interchangeable ticket, acceptable on trains everywhere, or two different mileage tickets, both to be under the jurisdiction of the Central Passenger Association. This latter proposition is favored by Chairman Donald.

Certain railroad officials claim that a plot of the ticket scalpers in the West has been discovered to deceive the Congressional Committee having in charge the anti-scalping bill. It is declared that the brokers had printed a number of fraudulent tickets, and that they then notified the railroad that these had been discovered by the scalpers The object of this scheme was to convince the committee that they, the scalpers, were of service to the railroads.

Eastbound freight rates from Chicago and St. Louis have never been in as bad a shape as at present, provisions, grain and other commodities being carried at less than one-half of tariff rates. Prominent shippers assert that they can get freight transported at any rate that they may desire.

During a little over seven weeks the receipts of wheat by lake steamers from Duluth at Chicago elevators, aggregated 3,644,363 bu. Chicago never before had any such receipts of grain by lake. Freight rates from Duluth have averaged over two cents a bushel.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the western termini of the trunk lines for the week ending Dec. 16 amounted to 85,428 tons, as compared with 79,292 tons the preceding week. This statement includes 35,935 tons of grain, 4,748 tons of flour and 18,256 tons of provisions, but not livestock. The following is the statement in detail for the two weeks:

Roads.	Week Ending Dec. 16.		Week Ending Dec. 9.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio	3,517	4.	5,459	6.9
C., C., C. & St. Louis	4 109	4.7	5,602	7 1
Erie	7 913	9.	9,188	11.6
Grand Trunk	3,956	4 5	4,141	5.2
L. S. & M. S.	9,936	11.3	8,614	10.9
Michigan Central	7,210	8 2	10,467	13 2
N. Y., Chi. & St. L.	7,943	9.	5,601	7.1
Pitts., Cin., Chi. & St. Louis	11 958	13 6	9,303	11.7
Pitts., Ft. Wayne & Chicago	16,807	19.	13,029	16.4
Wabash	11,079	12.6	7,888	9.9
Totals	85,428	100.0	79,292	100.0

Lake shipments last week were 33,706 tons.